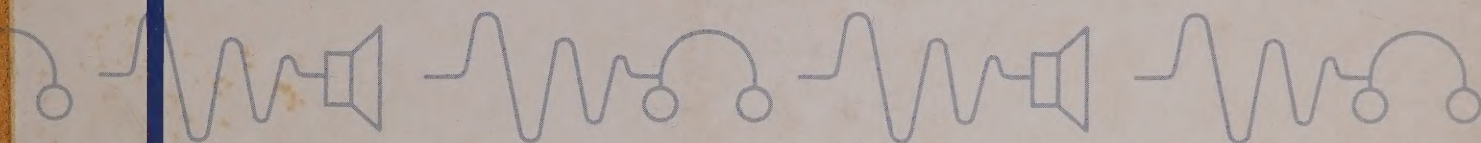


ARC TYPE F-16A AUDIO AMPLIFIER



Aircraft Radio Corporation
BOONTON, NEW JERSEY

ARC TYPE F-16A

AUDIO AMPLIFIER



Aircraft Radio Corporation
BOONTON, NEW JERSEY

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ARC reserves the right to make changes in design or additions to or improvements in its equipment without obligation to install such additions or improvements in equipment theretofore manufactured.

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Figure 1-1. ARC Type F-16A Audio Amplifier and ARC Type M-41A Mounting

SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION.

This book contains installation, operation, principles of operation, and maintenance information for the ARC Type F-16A Audio Amplifier.

1-2. PURPOSE AND USE.

The ARC Type F-16A Audio Amplifier (see Figure 1-1) is a transistorized, dual-channel, 10-watt audio amplifier. The F-16A is designed for use as a dual-channel cabin or interphone amplifier or as a dual-channel power amplifier in an isolation amplifier system.

The F-16A provides four audio input circuits (two microphone and two high-level). The microphone input circuits are used to amplify interphone signals from press-to-talk microphones. When used as a cabin or interphone amplifier, the high-level input circuits are used to amplify transmitter sidetone signals and the output of one or more receivers. When used as a power amplifier in an isolation amplifier system, the high-level circuits are used to amplify the output signals of two isolation preamplifiers such as the ARC Type F-19A Isolation Preamplifier.

1-3. SPECIFICATIONS.

Input Power Requirements:	0.44 ampere (standby) to 1.75 amperes (maximum rated output)
Maximum Audio Output (each channel):	10 watts (with less than 20% total harmonic distortion)
Maximum Audio Input (for 10 watts output):	7.5 volts rms across 600 ohms (high-level input channels) 0.5 volt rms in series with 100 ohms (microphone input channels)
Frequency Response:	Less than 3 db variation from 1000-cps reference level at all frequencies between 350 and 3000 cps
Transistor Complement (each channel):	2N270 Preamplifier 2N375 } Push-pull driver amplifier 2N375 } 2N375 } Push-pull power amplifier 2N375 }
Diode Complement (each channel):	1N91 Bias control
Mounting Required:	ARC Series 40 Mounting with Connector Kit ARC-22445
Dimensions:	2½ in. wide, 6½ in. high, 12⅞ in. deep
Weight:	6.6 pounds without two filter kits (ARC-24347); 7.2 pounds with filter kits
Certification:	FAA TSO C-50, Category A

1-4. ACCESSORIES.

The mounting required to support the F-16A is not supplied. An ARC Type M-41A Mounting (ARC-21790) is used to install the amplifier as an individual unit. For multiple-unit installations, the F-16A is installed on an ARC Type M-42A, M-43A, or M-44A Mounting with other ARC modular units.

The cable assembly required for connecting the F-16A to the primary power supply and audio distribution system is not supplied and should be fabricated using individual wires and the supplied ARC-22445 Connector Kit. The required cable will vary in length and in the number of individual wires used, depending on the location of the F-16A and the type of audio system used in the aircraft.

1-5. OPTIONAL EQUIPMENT.

The F-16A provides space for two ARC-24347 Filter Kits. Each kit consists of a 1020-cps filter (ARC-23877), a filter control relay (ARC-24110-0014), a 150-ohm, 2-watt, voltage-dropping resistor (ARC-203-0151), and an information plate (ARC-24824). The filters are used to attenuate 1020-cps navigation tone signals during the reception of voice signals. Single-pole single-throw toggle switches are used to control the operation of the filters.

1-6. DESCRIPTION.

The ARC Type F-16A Audio Amplifier is a ten-transistor, dual-channel unit designed for use in aircraft as a dual 10-watt cabin and interphone amplifier. The F-16A consists of five printed-circuit assemblies: filter assemblies A1 and A3, amplifier assemblies A2 and A4, and main assembly A5. Two audio input circuits (high-level and microphone) are provided by each channel of the amplifier. The high-level input circuits are used to amplify transmitter sidetone signals and the output of one or more receivers, or transmitter sidetone signals and the output of an isolation amplifier such as the ARC Type F-19A; the microphone input circuits are used to amplify interphone signals derived from press-to-talk carbon microphones.

Main assembly A5 consists of an aluminum chassis to which the front panel and a printed-circuit connector board are attached. The MIC LEVEL and INPUT LEVEL adjustment controls for each channel, a handle, and a mounting bracket are mounted on the front panel.

The printed-circuit connector board has four rows of gold-plated banana plugs which mate with jacks on assemblies A1 through A4. Six metal studs are placed on the board to prevent short circuits if the dust cover is pressed inward.

Filter assemblies A1 and A3 contain low-voltage filter circuits that reduce ripple and transient voltages from the applied primary voltage. Each assembly also provides space and mounting facilities for an ARC-24347 Filter Kit. The filter kit, an optional amplifier accessory, is used to attenuate 1020-cps navigation tone signals during the reception of voice-modulated transmissions on navigation frequencies.

Each filter assembly consists of an aluminum frame and

a printed-circuit board which supports low-voltage filter-circuit parts and a 1020-cps filter kit. A keyway in each side of each frame is used to guide the filter assemblies into position. Each assembly is held in position by two flat head screws.

Amplifier assemblies A2 and A4 are similar in construction to the filter assemblies. Each amplifier assembly contains five transistors used for the preamplifier stage, the push-pull driver stage, and the push-pull power-amplifier stage in one of the ten-watt audio channels. The preamplifier is used in the microphone input circuit only; the driver- and power-amplifier stages are common to both the microphone input circuit and the high-level input circuit.

SECTION II

INSTALLATION AND OPERATION

2-1. UNPACKING.

Remove all packing material from the packing case and carefully remove the equipment. Inspect the equipment for damage. Check the unit and its accessories against the packing slip to be sure all items have been received and removed from the packing case.

2-2. PREINSTALLATION TESTS.

Test Equipment Required. The ARC Type F-16A Audio Amplifier should be bench-tested before installation. The following equipment, or equivalent, is required for the test.

1. Low-voltage d-c power supply capable of delivering 2 amperes at 28 volts
2. Audio Oscillator, Hewlett-Packard Model 200AB
3. Voltmeter, Ballantine Model 300
4. Microphone, ARC-11937
5. Loudspeaker, 8 or 500 ohms, 15 watts
6. Resistors, 8 ohms and 500 ohms, 15 watts, non-inductive; 10 ohms and 100 ohms, 1 watt
7. Switch, toggle, spst

High-level Input Circuit Test.

Step 1. Interconnect F-16A and test equipment as shown in Figure 4-1.

Step 2. Loosen locknuts on INPUT LEVEL and MIC LEVEL gain controls. Set all controls to maximum clockwise position (maximum gain).

Step 3. Apply power to test equipment and allow a 5-minute warmup period.

Step 4. Connect Ballantine Model 300 Voltmeter across 500-ohm resistor.

Step 5. Apply power to F-16A.

Step 6. Adjust Hewlett-Packard Model 200AB Audio Oscillator to obtain a 1000-cps output frequency. Adjust AMPLITUDE control of audio oscillator to obtain a 71-volt indication on voltmeter.

Step 7. Using voltmeter, measure audio oscillator output voltage. It should not be greater than 7.5 volts.

Step 8. Connect 8-ohm resistor between pin 5 of J1 and ground. Connect voltmeter across this resistor and remove 500-ohm resistor from pin 6 of J1.

Step 9. Adjust output level of audio oscillator to obtain an 8.9-volt indication on voltmeter.

Step 10. Using voltmeter, measure audio oscillator output voltage. It should not be greater than 7.5 volts.

Step 11. Connect voltmeter across 8-ohm resistor. Vary output frequency of audio oscillator between 350 and 3000 cps. With a constant-level input signal, output of amplifier should be between 6.3 and 12.6 volts (8:9 volts ± 3 db).

Step 12. Connect 500-ohm resistor between pin 12 and ground. Connect voltmeter across 500-ohm resistor.

Step 13. Remove audio oscillator output lead from pin 9 of J1 and connect lead to pin 10 of J1. Remove 8-ohm resistor from pin 5 of J1.

Step 14. Repeat Steps 6 and 7.

Step 15. Connect 8-ohm resistor between pin 11 and ground. Connect voltmeter across this resistor and remove 500-ohm resistor from pin 12 of J1.

Step 16. Repeat Steps 9, 10, and 11.

Microphone Input Circuit Test.

Step 1. Perform Steps 1 through 5 of *High-level Input Circuit Test*.

Step 2. Remove output of Hewlett-Packard Model 200AB Audio Oscillator from pin 9 of J1. Connect output of audio oscillator through 100-ohm resistor to pin 1 of J1. Connect 10-ohm resistor across output terminals of audio oscillator.

Step 3. Adjust audio oscillator to obtain a 1000-cps output frequency. Adjust AMPLITUDE control of audio oscillator to obtain a 71-volt indication on Ballantine Model 300 Voltmeter.

Step 4. Using voltmeter, measure audio oscillator output voltage. It should not be greater than 0.5 volt.

Step 5. Connect voltmeter across 500-ohm resistor. Vary output frequency of audio oscillator between 350 and 3000 cps. With a constant-level input signal, output of amplifier should be between 50 and 100 volts (71 volts ± 3 db).

Step 6. Connect loudspeaker across appropriate channel A output pins (refer to Table I in Figure 4-1). Remove 500-ohm resistor from pin 6 of J1.

Step 7. Using microphone, check quality of amplified voice signals.

Step 8. Connect 500-ohm resistor between pin 12 of J1 and ground. Move audio oscillator output lead from pin 1 of J1 to pin 2 of J1. Remove loudspeaker connections from J1.

Step 9. Repeat Steps 3, 4, and 5.

Step 10. Connect loudspeaker across appropriate channel B output pins (refer to Table I in Figure 4-1). Remove 500-ohm resistor from pin 12 of J1.

Step 11. Move microphone lead from pin 1 of J1 to pin 2 of J1 and, using microphone, check quality of amplified voice signals.

1020-Cps Filter Test. If ARC-24347 Filter Kits are used with the amplifier, check the filters as follows:

Step 1. Interconnect F-16A and test equipment as shown in Figure 4-1.

Step 2. Connect Ballantine Model 300 Voltmeter

across 500-ohm resistor.

Step 3. Apply power to F-16A and test equipment. Allow a 5-minute warmup period.

Step 4. Close S1, and adjust Hewlett-Packard Model 200AB Audio Oscillator to obtain a 350-cps, 22-volt, channel A amplifier output.

Step 5. Vary output frequency of audio oscillator between 350 and 3000 cps. With a constant-level input signal, F-16A output should be attenuated at least 30 db at 1020 cps.

Step 6. Move 500-ohm resistor and voltmeter connection from pin 6 of J1 to pin 12 of J1. Move audio oscillator output lead from pin 9 of J1 to pin 10 of J1, and move S1 from pin 3 of J1 to pin 4 of J1.

Step 7. Close S1 and adjust audio oscillator to obtain a 350-cps, 22-volt, channel B amplifier output.

Step 8. Repeat Step 5.

Step 9. Turn all equipment off.

2-3. INSTALLATION CONSIDERATIONS.

A typical interconnection diagram for the F-16A when used with two ARC Type F-19A Isolation Amplifiers is shown in Figure 2-1. The actual location and type of installation used for the F-16A will depend on the type of system in which the F-16A is used and the space available in the aircraft. To facilitate installation and maintenance:

1. Compare the installation area under consideration with the dimensions of the equipment (see Figure 2-2).
2. Locate the unit and cable where they will be accessible for inspection and maintenance and in an area that is free of excessive vibration and heat.
3. Allow sufficient clearance on all sides of the unit for sway, ventilation, and easy removal.
4. Do not run cable where it may be subjected to excessively high temperatures or where it may be inductively coupled to noise-generating equipment.
5. Position loudspeaker(s) to reduce acoustical feedback.

2-4. INSTALLATION PROCEDURES.

The F-16A may be installed as a separate unit on an ARC Type M-41A Mounting, or with other ARC modular units on an ARC Type M-42A, M-43A, or M-44A Mounting. Figure 2-2 shows the installation dimensions for the F-16A and the M-41A. Refer to the "Series 40 Mountings" instruction book for M-42A, M-43A, and M-44A installation dimensions. Connector Kit ARC-22445 is required to install the F-16A on an ARC Series 40 Mounting. Assembly details for the connector kit are shown in Figure 2-3. To install the F-16A, proceed as follows:

Step 1. Drill the aircraft mounting surface for either eight (M-41A) or 16 (M-42A, M-43A, or M-44A) No. 6 binding head screws (see Figure 2-2 or the "Series 40 Mountings" instruction book). The mounting surface should be clean, bare metal to insure proper grounding of the unit.

Note

The bottom plate of an ARC Series 40 Mounting may be used as a template for locating the mounting holes.

Step 2. Insert the required number of screws through the mounting and the holes in the aircraft mounting surface. Secure the mounting with nuts and lockwashers.

Step 3. Cut the wires for the interconnecting cable assembly to the required lengths (use color-coded wires, or tag wires at both ends).

Step 4. Remove the coupling box from the rack. Remove the top cover from the coupling box.

Step 5. Attach the ARC-21766 Connector to the coupling box as shown in Figure 2-3.

Step 6. Remove the insulation from both ends of each wire in the cable assembly, and solder the contacts (supplied with the connector kit) to the wires.

Step 7. Loosen the coupling box cable clamp. Feed the end of the cable assembly that is terminated in the connector contacts through the cable clamp. Insert the contacts in the appropriate connector holes (see Figure 2-4). Be sure that each contact is seated.

Note

To remove a contact from the block, use Contact Removing Tools ARC-22001 and ARC-22002.

Step 8. Arrange the cable wires so that they will not pull on the connector contacts when the cable clamp is tightened. Tighten the cable clamp, and replace the top cover of the coupling box.

Step 9. Place the coupling box on the rear of the mounting and secure the box, using the snapsides on the rear of the mounting.

Step 10. Place the F-16A on the mounting. Secure the amplifier to the mounting by tightening the clamp on

the front of the mounting. Safety-wire the thumbscrew of the clamp in position.

2-5. INITIAL ADJUSTMENTS AND TESTS.

After installation, the F-16A INPUT LEVEL and MIC LEVEL controls should be adjusted, and an operational test of the amplifier and associated equipment should be made. Proceed as follows:

Step 1. Apply power to amplifier and associated equipment.

Step 2. Operate a receiver or transmitter to apply a high-level input signal to channel A of the F-16A. Adjust the CHANNEL A INPUT LEVEL control to obtain the desired speaker or headset volume.

Note

If a volume control is used in the aircraft's audio distribution system, turn the control to its mid-position before adjusting the F-16A control.

Step 3. Repeat Step 2 for channel B.

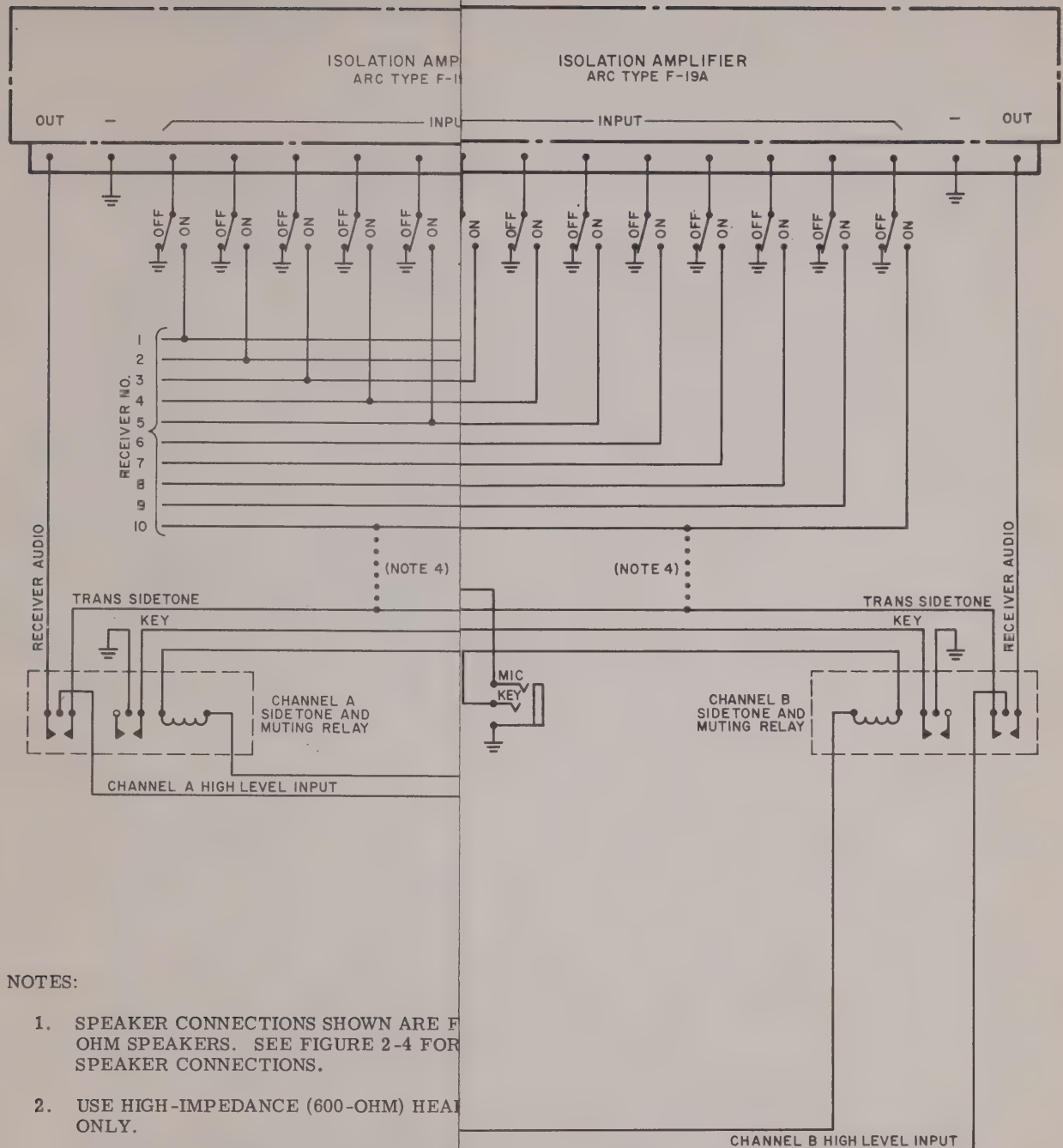
Step 4. Operate a microphone to apply a low-level input signal to the F-16A channel A microphone input circuits. Adjust the CHANNEL A MIC LEVEL control to obtain the desired speaker or headset volume.

Step 5. Repeat Step 4 for channel B.

Step 6. Check the output of each F-16A channel by applying a high-level input signal and then a low-level input signal to the individual channels of the amplifier. The output of each channel should be clear and there should be no acoustical feedback during the application of either input signal.

2-6. OPERATION.

With the exception of amplifiers that contain ARC-24347 Filter Kits, the operation of the F-16A is automatic after the application of power. When filter kits are used, the input signals applied to the high-level input circuits of the F-16A may be filtered to attenuate 1020-cps signals. The application of power and the operation of the filters are controlled by separate single-pole single-throw toggle switches (see Figure 2-1). The switches may be installed on the aircraft instrument panel or as part of a control unit.



NOTES:

1. SPEAKER CONNECTIONS SHOWN ARE FOR 8 OHM SPEAKERS. SEE FIGURE 2-4 FOR SPEAKER CONNECTIONS.
2. USE HIGH-IMPEDANCE (600-OHM) HEADPHONE PLUGS ONLY.
3. USE CARBON PRESS-TO-TALK MICROPHONE ONLY.
4. IF THE PILOT DESIRES TO MONITOR THE PILOT'S SIDETONE CIRCUIT, OR THE COPILOT'S SIDETONE CIRCUIT, CONNECT THE PILOT'S SIDETONE LEADS TO F-19A INPUT LEADS SHOWN BY THE DOTTED LINES.

Figure 2-1. F-16A Audio Amplifier,
Typical Interconnection Diagram

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Step 1. Drill the aircraft mounting surface for either eight (M-41A) or 16 (M-42A, M-43A, or M-44A) No. 6 binding head screws (see Figure 2-2 or the "Series 40 Mountings" instruction book). The mounting surface should be clean, bare metal to insure proper grounding of the unit.

Note

The bottom plate of an ARC Series 40 Mounting may be used as a template for locating the mounting holes.

Step 2. Insert the required number of screws through the mounting and the holes in the aircraft mounting surface. Secure the mounting with nuts and lockwashers.

Step 3. Cut the wires for the interconnecting cable assembly to the required lengths (use color-coded wires, or tag wires at both ends).

Step 4. Remove the coupling box from the rack. Remove the top cover from the coupling box.

Step 5. Attach the ARC-21766 Connector to the coupling box as shown in Figure 2-3.

Step 6. Remove the insulation from both ends of each wire in the cable assembly, and solder the contacts (supplied with the connector kit) to the wires.

Step 7. Loosen the coupling box cable clamp. Feed the end of the cable assembly that is terminated in the connector contacts through the cable clamp. Insert the contacts in the appropriate connector holes (see Figure 2-4). Be sure that each contact is seated.

Note

To remove a contact from the block, use Contact Removing Tools ARC-22001 and ARC-22002.

Step 8. Arrange the cable wires so that they will not pull on the connector contacts when the cable clamp is tightened. Tighten the cable clamp, and replace the top cover of the coupling box.

Step 9. Place the coupling box on the rear of the mounting and secure the box, using the snapslides on the rear of the mounting.

Step 10. Place the F-16A on the mounting. Secure the amplifier to the mounting by tightening the clamp on

the front of the mounting. Safety-wire the thumbscrew of the clamp in position.

2-5. INITIAL ADJUSTMENTS AND TESTS.

After installation, the F-16A INPUT LEVEL and MIC LEVEL controls should be adjusted, and an operational test of the amplifier and associated equipment should be made. Proceed as follows:

Step 1. Apply power to amplifier and associated equipment.

Step 2. Operate a receiver or transmitter to apply a high-level input signal to channel A of the F-16A. Adjust the CHANNEL A INPUT LEVEL control to obtain the desired speaker or headset volume.

Note

If a volume control is used in the aircraft's audio distribution system, turn the control to its mid-position before adjusting the F-16A control.

Step 3. Repeat Step 2 for channel B.

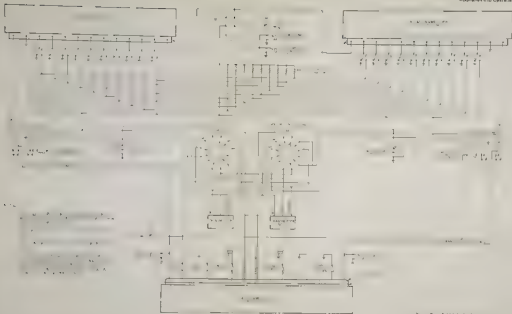
Step 4. Operate a microphone to apply a low-level input signal to the F-16A channel A microphone input circuits. Adjust the CHANNEL A MIC LEVEL control to obtain the desired speaker or headset volume.

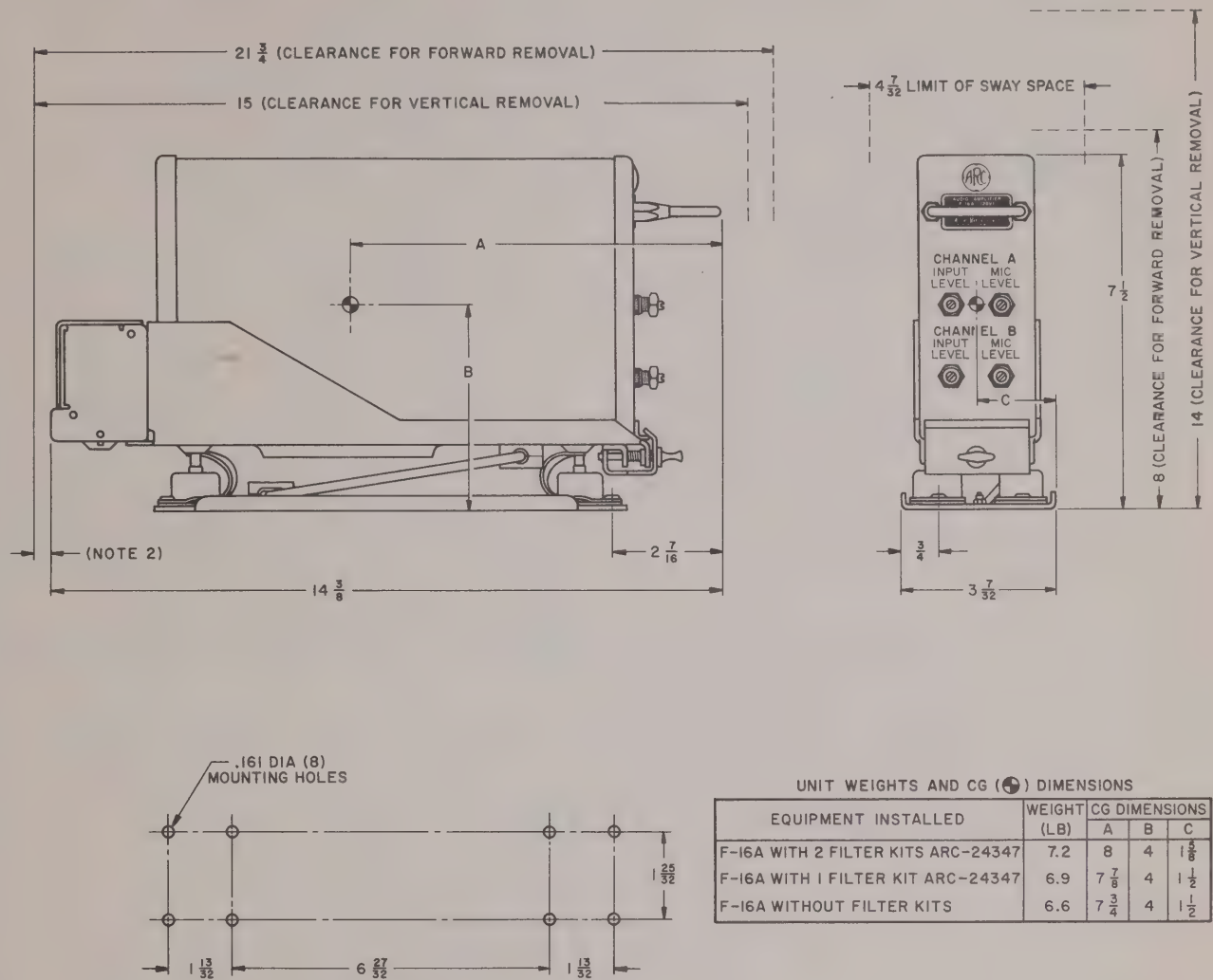
Step 5. Repeat Step 4 for channel B.

Step 6. Check the output of each F-16A channel by applying a high-level input signal and then a low-level input signal to the individual channels of the amplifier. The output of each channel should be clear and there should be no acoustical feedback during the application of either input signal.

2-6. OPERATION.

With the exception of amplifiers that contain ARC-24347 Filter Kits, the operation of the F-16A is automatic after the application of power. When filter kits are used, the input signals applied to the high-level input circuits of the F-16A may be filtered to attenuate 1020-cps signals. The application of power and the operation of the filters are controlled by separate single-pole single-throw toggle switches (see Figure 2-1). The switches may be installed on the aircraft instrument panel or as part of a control unit.


 Figure 10. P-100 Audio Amplifier
 Revised Implementation Program



NOTES:

1. DIMENSIONS ARE IN INCHES.
2. ALLOW 2 INCHES AT REAR FOR CABLE BEND.
3. WEIGHT: F-16A, SEE TABLE; M-41A, 1.4 LB.

Figure 2-2. F-16A Audio Amplifier with M-41A Mounting, Installation Dimensions

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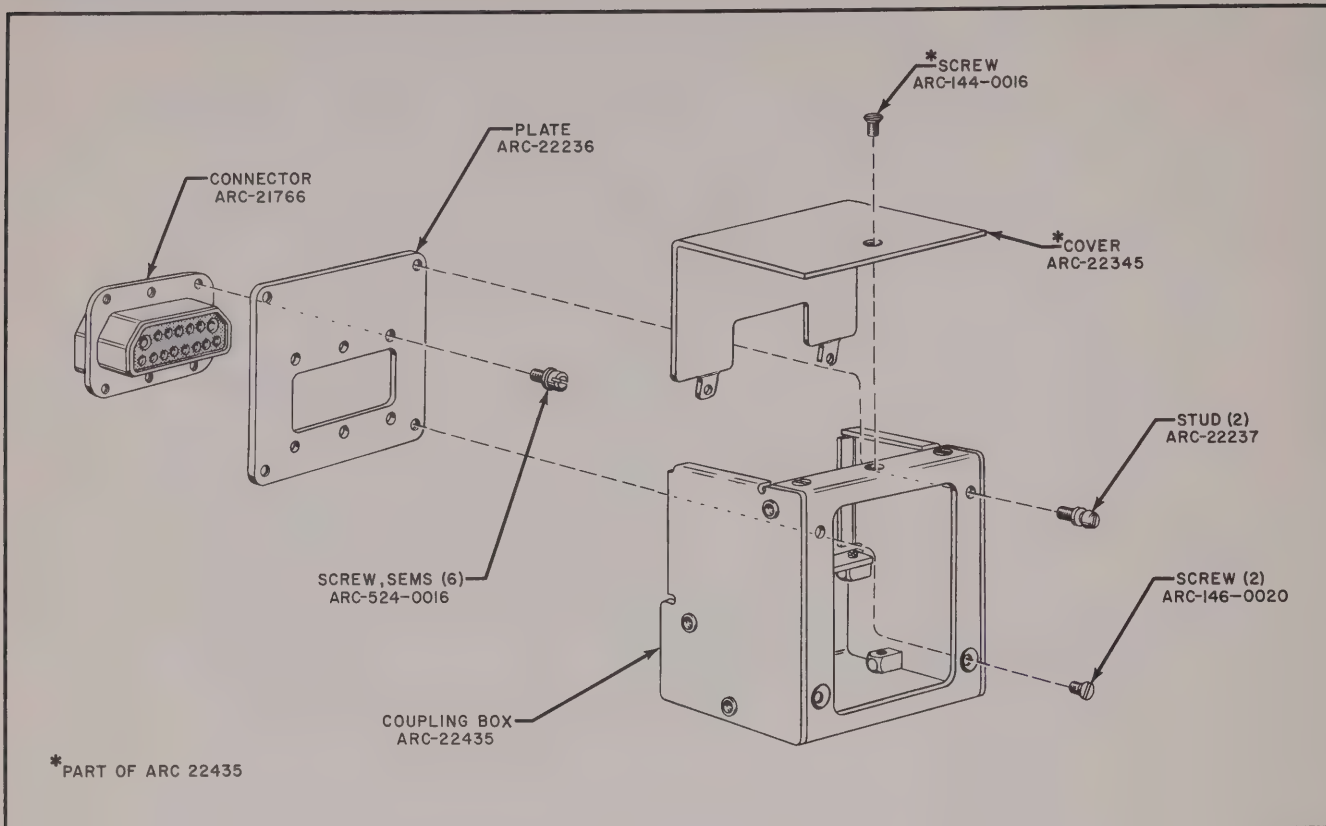


Figure 2-3. Connector Kit ARC-22445, Assembly Details

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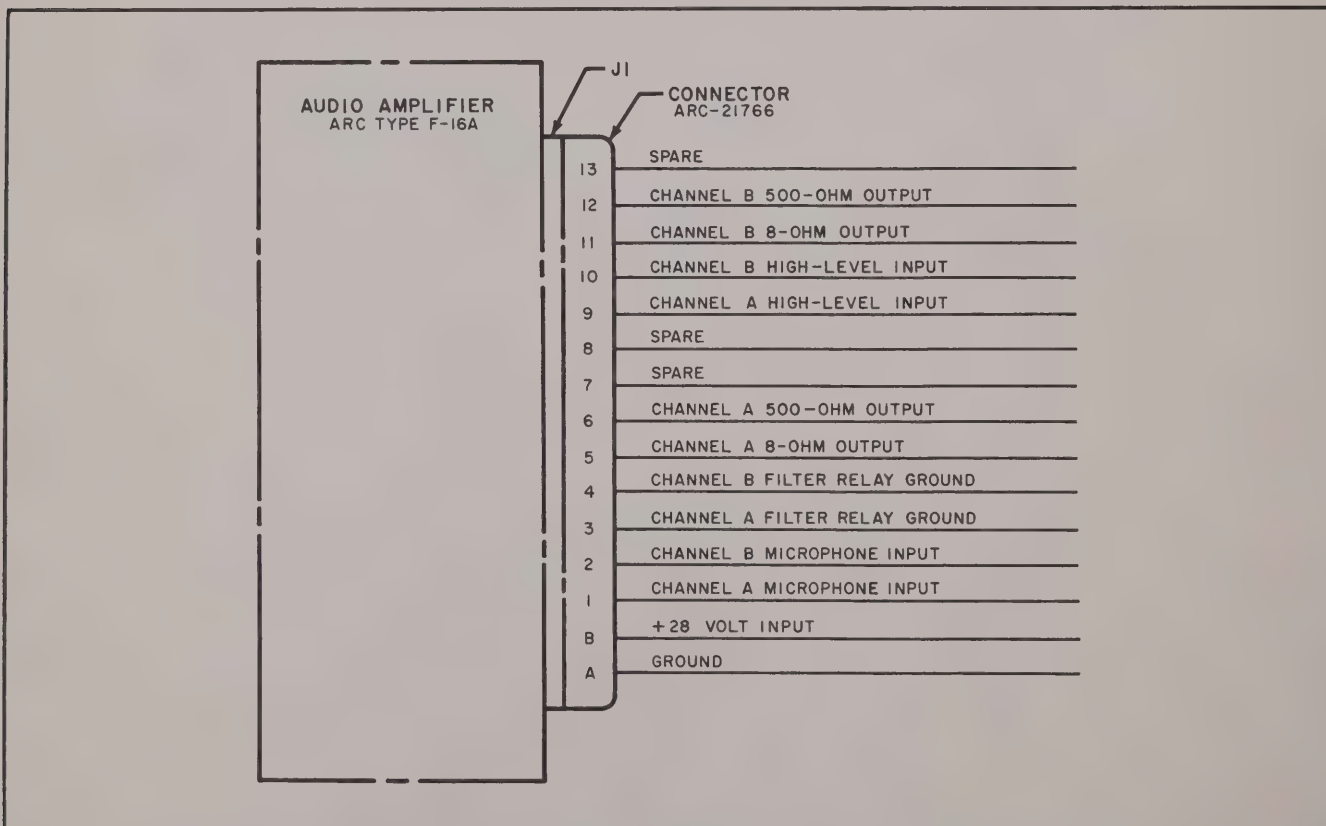


Figure 2-4. F-16A Audio Amplifier, External Wiring Diagram

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SECTION III

PRINCIPLES OF OPERATION

3-1. INTRODUCTION.

This section describes the principles of operation of the ARC Type F-16A Audio Amplifier and the ARC-24347 Filter Kit. The F-16A contains two identical 10-watt audio channels. The amplifier is designed for use in aircraft as a dual-channel cabin or interphone amplifier, or as a dual-channel power amplifier in an isolation amplifier system (see Figure 2-1). The F-16A may be used to amplify transmitter sidetone signals, receiver output signals, isolation amplifier output signals, and microphone (interphone) signals.

3-2. CIRCUIT DESCRIPTION.

Functional Description. As shown in Figure 3-1, the F-16A has a high-level input and a microphone input circuit in each channel. In operation, channel A high-level input signals are applied to driver amplifiers A2Q2 and A2Q3, either directly or through 1020-cps filter A1Z1. The output of the driver amplifiers is applied to power amplifiers A2Q4 and A2Q5 where the power level of the signals is increased to a maximum of 10 watts. The output of A2Q4 and A2Q5 is then applied to channel A audio transducers. In a similar manner, channel B high-level input signals are applied through filter A3Z1 (if used), driver amplifiers A4Q2 and A4Q3, and power amplifiers A4Q4 and A4Q5 to the channel B audio transducers.

Channel A and channel B microphone signals are applied to their respective preamplifier circuits (A2Q1 and A4Q1). The preamplifiers increase the level of the input signals to the level required by the following driver-amplifier stage. The amplified microphone signals are then applied through the associated driver and power amplifiers to the appropriate audio transducers.

Note

In certain applications, all interphone signals are applied to the microphone input circuits of both channels (see Figure 2-1).

Operating voltage for the F-16A is applied through low-voltage filters (one in each channel) to the amplifier stages of each channel. The filters attenuate transient and ripple voltages present in the low-voltage supply circuit.

Note

Since the circuits in channel A are identical to the circuits in channel B, the following descriptions apply to both channels of the F-16A.

1020-cps Filter. Filter A1Z1, a high-Q band-rejection circuit, attenuates 1020-cps navigational tone signals at least 35 db below the unfiltered 1000-cps reference frequency, but passes audio frequencies outside the rejection band with less than a 3-db reduction in signal strength. The filter is switched in or out of the high-level input channel by relay A1K1 (see Figure 5-1). The relay is controlled by a single-pole single-throw toggle switch that controls the application of ground to the relay coil. The switch is remotely located at the operator's position.

Preamplifier. A2Q1, a 2N270 p-n-p transistor, is connected as a low-impedance, common-emitter voltage amplifier (see Figure 5-1). The stage is used to amplify low-level microphone signals only. When the press-to-talk switch on the carbon microphone is closed, audio signals from the microphone are applied to the base of A2Q1. The signals are amplified by A2Q1 and are then transformer-coupled to the push-pull driver stage.

Variable-resistor A5R2 (MIC LEVEL) controls the gain of the preamplifier by adjusting the amount of degenerative feedback applied to the emitter of the transistor. With A5R2 set to its maximum clockwise position, capacitor A2C2 bypasses resistor A5R2 and degenerative feedback is minimum. With A5R2 set to its maximum counterclockwise position, A5R2 is not bypassed and degenerative feedback is maximum. A temperature-sensitive resistor, A2R5, is used to make the

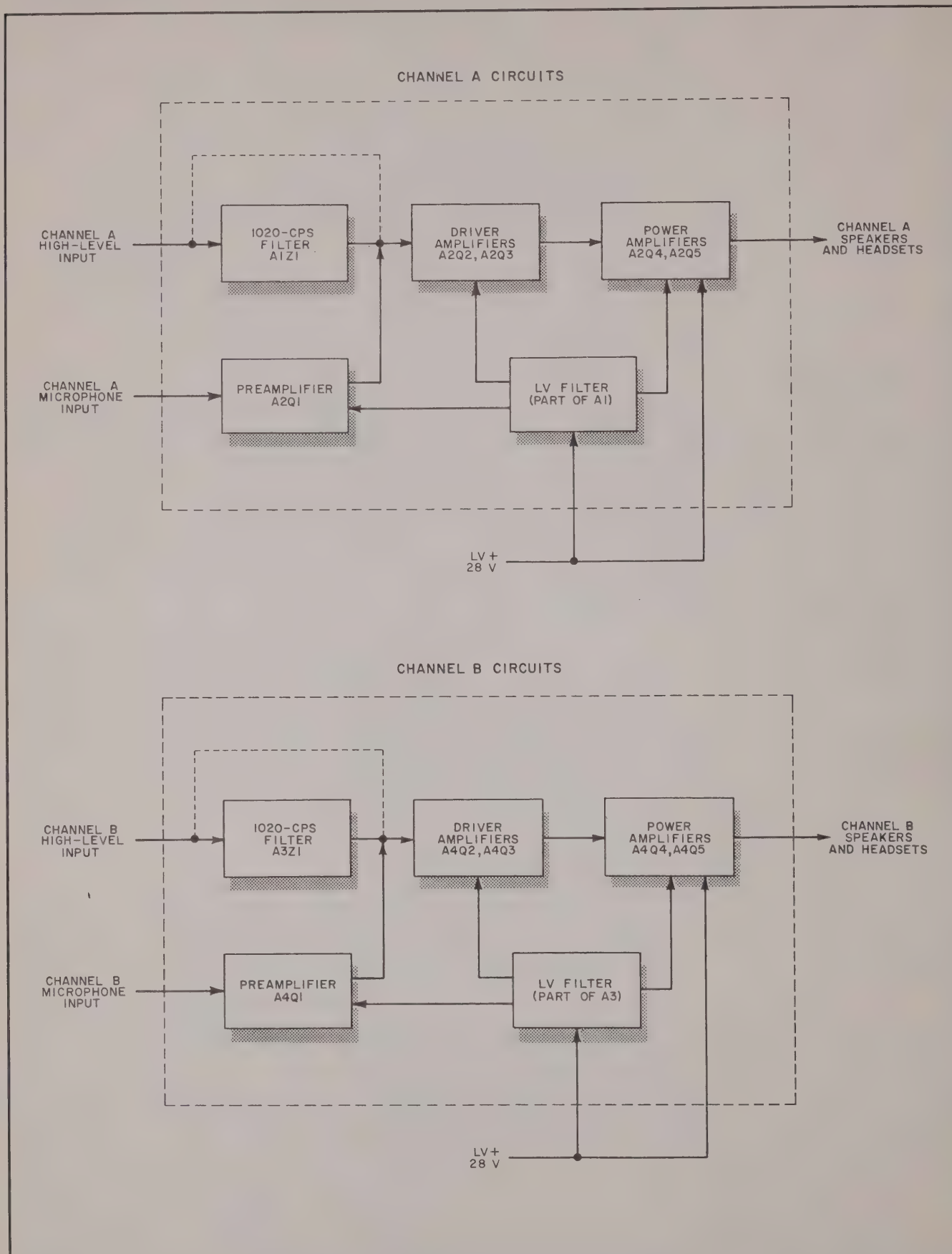


Figure 3-1. F-16A Audio Amplifier, Block Diagram

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gain of the amplifier practically constant for all temperatures between -55°C (-67°F) and $+71^{\circ}\text{C}$ ($+160^{\circ}\text{F}$).

Driver Amplifier. A2Q2 and A2Q3, 2N375 p-n-p transistors, are connected in a common-emitter, class B push-pull driver-amplifier circuit (see Figure 5-1). Base bias for the transistors is controlled by a voltage divider consisting of series-connected resistor A2R6 and crystal diode A2CR1. Since current flow through the divider develops the transistor bias voltage, a variation in the resistance of A2CR1 will produce a corresponding variation in the bias voltage. Resistance variations are presented by A2CR1 which, being a junction diode, has a negative temperature coefficient of resistance, that is, when temperature decreases, the resistance of A2CR1 increases and vice versa.

The base voltage required by A2Q2 and A2Q3 for class B operation varies directly with the temperature of the transistors. For example, a base voltage that produces class B operation at normal room temperature will tend to produce class C operation as the temperature lowers. Diode A2CR1 maintains class B operation for all temperatures between -55°C (-67°F) and $+71^{\circ}\text{C}$ ($+160^{\circ}\text{F}$) by reducing the voltage applied to the base of A2Q2 and A2Q3 as the temperature decreases and increasing the base voltage of A2Q2 and A2Q3 as the temperature increases. Both high-level input signals and microphone input signals are coupled to the driver stage through interstage coupling transformer A2T1. Microphone input signals are applied through preamplifier A2Q1 to the transformer; high-level input signals are applied through the 1020-cps filter (if used), ground isolation resistor A1R2, temperature-compensating resistor A1R1, and a portion of variable resistor A5R1

(INPUT LEVEL) to the transformer. When a microphone signal is applied to preamplifier A2Q1, the high-level input circuit is grounded (muted) to prevent interaction. Since high-level input signals are applied to the primary of A2T1 and the transformer primary also serves as the output load for the preamplifier, the high-level-input muting ground must be isolated from the transformer. Isolation is accomplished by resistors A1R1 and A1R2. Resistor A1R1 is a temperature-sensitive device that, in addition to providing isolation, reduces the effects of temperature variations on the high-level gain of the amplifier. The gain of the driver stage is reduced slightly by degenerative feedback applied to the base of A2Q2 and A2Q3 through feedback resistor A2R8. The degenerative feedback is used to improve the fidelity of the F-16A.

Power Amplifier. A2Q4 and A2Q5, 2N375 p-n-p transistors, are connected in a common-collector, class B push-pull power-amplifier circuit (see Figure 5-1). In operation, the output signal of the driver amplifier is coupled to the power amplifier by transformer A2T2. The power amplifier increases the power level of the signal to a maximum of 10 watts. The amplified output of A2Q4 and A2Q5 is then coupled by impedance-matching output transformer A5T1 to the audio transducers.

Main Assembly A5. The main assembly consists of an aluminum chassis to which the front panel and a printed-circuit connector board are attached. The MIC LEVEL and INPUT LEVEL adjustment controls for each channel are mounted on the front panel, and the audio output transformers are mounted on the rear of the chassis. The primary functions of the A5 assembly are interconnection and support of assemblies A1 through A4.

SECTION IV

MAINTENANCE

4-1. INTRODUCTION.

This section contains test equipment data, removal and replacement procedures, performance test procedures, trouble analysis information, and voltage measurement data for the ARC Type F-16A Audio Amplifier. Interior views (Figure 4-2 through Figure 4-5) are included to help service personnel locate and identify individual assemblies and detail parts. The schematic and wiring diagrams required for trouble-shooting are included in Section V.

4-2. TEST EQUIPMENT.

Table 4-1 lists the test equipment required for maintenance of the F-16A; equivalent test equipment may be substituted.

4-3. REMOVAL AND REPLACEMENT.

Separation of Assemblies.

Step 1. Remove the F-16A dust cover by releasing the Dzus fastener at the rear of the cover and pulling the unit forward.

Step 2. Remove the eight flat head screws that attach assemblies A1 through A4 to main assembly A5.

Step 3. Remove assemblies A1 through A4 by lifting them out of the main assembly. Removal may be facilitated by inserting a screwdriver in the slots provided below the assembly mounting screws, and lifting.

Replacement of Printed-circuit Parts. Be careful when removing a part from any of the F-16A printed-circuit

boards. The leads of the part being replaced should be cut close to the board and then pulled out of the printed-circuit side of the board after the solder is melted. An attempt to pull the part out by its body may damage the board because of the crimped leads on the parts. A light pencil iron should be used to melt the solder. When a part is replaced, hold each lead or terminal with a pair of pliers between the body of the part and the soldering point to form a heat sink.

Note

Do not apply heat longer than necessary, and remove the cut lead as quickly as possible. After parts are replaced and the board has cooled, brush Dow-Corning 991 Silicone Varnish over the joint to make the surface moisture-repellent.

Replacement of Amplifier Assembly Parts. Driver amplifier transistors A2Q2, A2Q3, A4Q2, and A4Q3 and power amplifier transistors A2Q4, A2Q5, A4Q4, and A4Q5 are plug-in parts. Remove the driver transistors by unscrewing the two mounting screws in each transistor and lifting the transistors directly upward. Remove the power amplifier transistors by unscrewing the six heat-transfer plate mounting screws on each assembly, removing the heat-transfer plates, and lifting each transistor directly upward.

Caution

A thin mica plate insulates the driver transistors from the frame of each amplifier assembly. Do not use a screwdriver to pry up the transistors.

TABLE 4-1. TEST EQUIPMENT

Qty	Name	Designation	Characteristics
1	Ammeter	Weston Model 301	0 to 3 amperes
1	Audio Oscillator	Hewlett-Packard Model 200AB	—
1	Loudspeaker	—	8 or 500 ohms, 15 watts, PM
1	Low-voltage Supply	—	28 volts, 1.5 amperes dc
1	Microphone	ARC-11937	Carbon, push-to-talk
1	Milliammeter	Weston Model 301	0 to 500 milliamperes
1	Multimeter	Simpson Model 260	—
6	Resistors	—	Two 8-ohm and two 500-ohm, 15-watt, noninductive; one 10-ohm and one 100-ohm, 1-watt
1	Toggle Switch	—	Single-pole single-throw
1	Vacuum Tube Voltmeter	Ballantine Model 300	—
1	Vacuum Tube Voltmeter	Hewlett-Packard Model 410B	—

Replace resistor A2R6, A2R7, A4R6, or A4R7 as follows:

Step 1. Remove the appropriate driver and power amplifier transistors as described in the preceding paragraph.

Step 2. Remove the aluminum frame from the assembly by unscrewing the binding head screw located at each corner of the large printed-circuit board (ARC-23665) and sliding the frame off the assembly.

Step 3. Remove the four insulating shoulder washers from the driver transistor mounting studs.

Step 4. Replace the resistor and then replace the aluminum frame and the transistors.

Note

Before replacing the frame, be sure the four insulating shoulder washers are installed on the driver transistor mounting studs.

4-4. PERFORMANCE TEST.

General. Table 4-2 outlines the performance test required to check the operation of the F-16A Audio Amplifier. The performance test is divided into several individual tests which must be performed in the order given. The test equipment required is listed in Table 4-1.

Test Conditions. Unless otherwise specified, the following conditions apply when testing the F-16A:

Input voltage:	27.5 volts dc.
Audio output load:	8- and 500-ohm, 15-watt, noninductive resistors are used to provide the proper audio load.
Dummy microphone:	A 10-ohm resistor and a 100-ohm resistor are used as a dummy microphone. The dummy microphone is required when the output of the Hewlett-Packard Model 200AB Audio Oscillator is applied to the microphone input circuits of the F-16A.

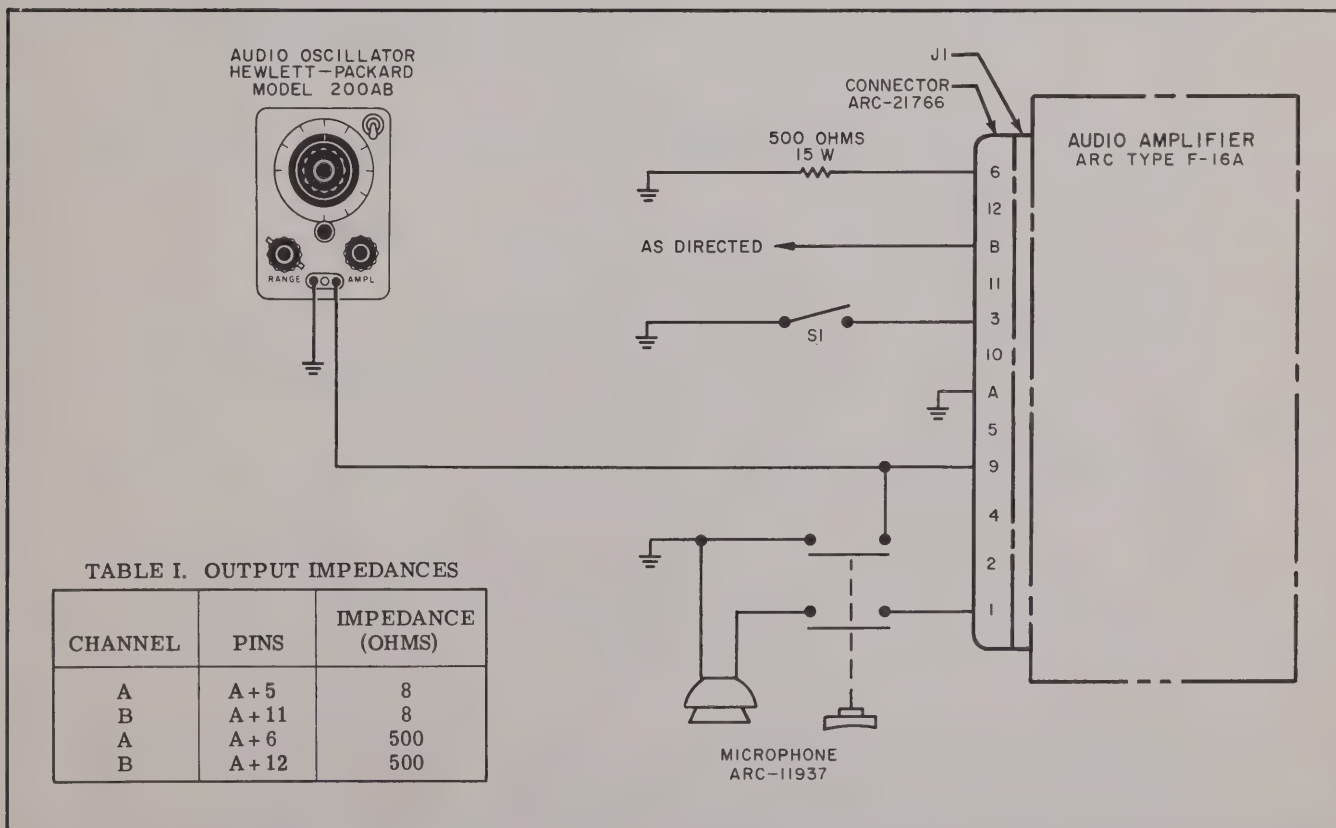


Figure 4-1. F-16A Audio Amplifier, Bench Test Interconnection Diagram

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TABLE 4-2. F-16A PERFORMANCE TEST

Step	Procedure	Normal Indication
PRELIMINARY PROCEDURE		
1	Interconnect F-16A and test equipment as shown in Figure 4-1.	None.
2	Loosen locknuts on INPUT LEVEL and MIC LEVEL controls. Set all controls to maximum clockwise position (maximum gain).	None.
3	Apply power to test equipment and allow a 5-minute warmup period.	None.
D-C INPUT CURRENT		
4	Connect negative terminal of Weston Model 301 (0-500 ma) Milliammeter to terminal B of J1. Connect positive terminal of milliammeter to +27.5 volts dc.	With no signal applied to either channel of the F-16A, d-c supply current should be 440 ma $\pm 20\%$.
5	Connect Ballantine Model 300 Voltmeter between pin 6 of J1 and ground. Replace 0-500 ma milliammeter with Weston Model 301 (0-3 amp) Ammeter.	None.
6	Adjust Hewlett-Packard Model 200AB Audio Oscillator for a 1000-cps output. Adjust AMPLITUDE control of audio oscillator for a 71-volt indication on voltmeter.	With a 10-watt channel A output, d-c supply current should be 1.1 amperes $\pm 20\%$.
7	Connect second 500-ohm resistor between pin 12 of J1 and ground. Move output lead of audio oscillator from pin 9 of J1 to pin 10 of J1, and connect voltmeter between pin 12 of J1 and ground.	None.
8	Adjust AMPLITUDE control of audio oscillator for a 71-volt indication on voltmeter.	With a 10-watt channel B output, d-c supply current should be 1.1 amperes $\pm 20\%$.
AUDIO		
9	Measure audio oscillator output voltage required to obtain a 71-volt, channel B output.	Voltage should not be greater than 7.5 volts.
10	Move audio oscillator output lead from pin 10 of J1 to pin 9 of J1, and connect voltmeter between pin 6 of J1 and ground. Adjust AMPLITUDE control of audio oscillator to obtain a 71-volt indication on voltmeter.	None.
11	Measure audio oscillator output voltage required to obtain a 71-volt, channel A output.	Voltage should not be greater than 7.5 volts.
12	Remove +27.5 volts dc from pin B of J1. Remove 500-ohm resistors from pins 6 and 12 of J1. Connect 8-ohm resistors between pin 5 of J1 and ground and between pin 11 of J1 and ground.	None.
13	Apply +27.5 volts dc to pin B of J1. Connect voltmeter between pin 5 of J1 and ground, and adjust AMPLITUDE control of audio oscillator to obtain an 8.9-volt, channel A output.	Voltmeter indicates 8.9 volts.
14	Measure audio oscillator output voltage.	Voltage should not be greater than 7.5 volts.
15	Move audio oscillator output lead from pin 9 of J1 to pin 10 of J1. Connect voltmeter between pin 11 of J1 and ground, and adjust AMPLITUDE control of audio oscillator to obtain an 8.9-volt, channel B output.	Voltmeter indicates 8.9 volts.

TABLE 4-2. F-16A PERFORMANCE TEST—Continued

Step	Procedure	Normal Indication
AUDIO—Continued		
16	Measure audio oscillator output voltage.	Voltage should not be greater than 7.5 volts.
17	Connect output of audio oscillator through 100-ohm resistor to pin 2 of J1. Connect 10-ohm resistor across output terminals of audio oscillator. Connect voltmeter between pin 11 of J1 and ground, and adjust AMPLITUDE control of audio oscillator to obtain an 8.9-volt, channel B output.	Voltmeter indicates 8.9 volts.
18	Measure audio oscillator output voltage.	Voltage should not be greater than 0.5 volt.
19	Move audio oscillator output lead from pin 2 of J1 to pin 1 of J1. Connect voltmeter between pin 5 of J1 and ground, and adjust AMPLITUDE control of audio oscillator to obtain an 8.9-volt, channel A output.	Voltmeter indicates 8.9 volts.
20	Measure audio oscillator output voltage.	Voltage should not be greater than 0.5 volt.
FREQUENCY RESPONSE		
21	Connect voltmeter between pin 5 of J1 and ground.	Voltmeter should indicate 8.9 volts.
22	Vary output frequency of audio oscillator between 350 and 3000 cps.	With a constant-level input signal, channel A output should be between 6.3 and 12.6 volts (8.9 volts ± 3 db).
23	Move audio oscillator output lead from pin 1 of J1 to pin 2 of J1. Connect voltmeter between pin 11 of J1 and ground, and adjust audio oscillator to obtain a 1000-cps, 8.9-volt channel B output.	Voltmeter indicates 8.9 volts.
24	Vary output frequency of audio oscillator between 350 and 3000 cps.	With a constant-level input signal, channel B output should be between 6.3 and 12.6 volt (8.9 volts ± 3 db).
1020-CPS FILTER		
25	Adjust audio oscillator for a 1000-cps, 8.9-volt channel B output. Connect switch S1 to pin 4 of J1.	Voltmeter indicates 8.9 volts.
26	Adjust audio oscillator for a 1020-cps channel B output. Close switch S1.	Voltmeter should indicate less than 0.3 volt.
27	Move audio oscillator output lead from pin 2 of J1 to pin 1 of J1. Connect voltmeter between pin 5 of J1 and ground, and adjust audio oscillator for a 1000-cps, 8.9-volt channel A output. Move switch S1 from pin 4 of J1 to pin 3 of J1.	Voltmeter indicates 8.9 volts.
28	Adjust audio oscillator for a 1020-cps channel A output. Close switch S1.	Voltmeter should indicate less than 0.3 volt.

4-5. TROUBLE ANALYSIS.

General. The isolation of trouble requires a systematic method of localizing the trouble first to a channel, then to a particular stage within the channel, and finally to the defective part or parts within the stage. Isolation of

trouble to a particular channel requires nothing more than an operational check of the unit. Isolation of trouble to a particular stage and finally to a part or parts within the stage may require the use of voltage measurements (see Figure 4-6).

Note

Circuit trouble-shooting, based on the use of resistance measurements, is not recommended since transistors will produce wide variations in the resistance of circuits that are operating properly. However, resistance tests of individual parts may be made if transistors are removed from the circuit containing the part.

further in localizing troubles, refer to the principles of operation discussion in Section III and the schematic diagram in Section V.

Note

When using the trouble-shooting table, the items listed in the Probable Cause column for a particular Symptom should be investigated in the order given.

Trouble-shooting Chart. Table 4-3 lists the symptoms of some possible troubles, their probable causes, and the analysis procedures that should be used to verify each probable cause. The table should be referred to after the trouble has been isolated to a particular channel. To assist

4-6. VOLTAGE MEASUREMENTS.

Typical a-c signal voltage measurements and d-c operating voltage measurements are given in Figure 4-6. All measurements were made under the conditions noted.

TABLE 4-3. TROUBLE-SHOOTING CHART

<i>Symptom</i>	<i>Probable Cause</i>	<i>Analysis Procedure</i>
No output from one channel. F-16A is drawing excessive current.	Part in LV+ filter circuit shorted to ground.	Remove plug from J1. Use a Simpson Model 260 Multimeter to check resistance to ground of parts in LV+ filter circuit. Caution Remove A1 or A3 from F-16A before making resistance tests, and observe polarity markings on A1C1 and A1C2 or A3C1 and A3C2 during tests.
	Output transformer shorted.	Remove A1 and A2 or A3 and A4 from F-16A. Use Model 260 multimeter to check A5T1 or A5T2 for a primary-to-secondary short or a primary-to-ground short. Resistance of primary to ground and primary to secondary should be infinite; resistance of secondary (terminal 8) to ground should be 72 ± 10 ohms. Caution If A5T1 is shorted, check A5R3 for a change in value. If A5T2 is shorted, check A5R4 for a change in value.
No output from one channel. F-16A is drawing normal standby current.	Defective part in amplifier circuits.	Replace A2Q2 through A2Q5 or A4Q2 through A4Q5 in turn. If trouble continues, check operating voltages (see Figure 4-6).
High-level output signals of one channel distorted.	External high-level signal source overloading amplifier.	Reduce output level of external signal source. If trouble continues, adjust appropriate INPUT LEVEL control as outlined in paragraph 2-5.

TABLE 4—3. TROUBLE-SHOOTING CHART—Continued

<i>Symptom</i>	<i>Probable Cause</i>	<i>Analysis Procedure</i>
Microphone output signals of one channel distorted.	Transmitter element of carbon microphone defective.	Replace microphone.
	Defective part in preamplifier stage.	Replace A2Q1 or A4Q1. If trouble continues, check A2C1 and A2C2 or A4C1 and A4C2.
Microphone and high-level output signals of one channel distorted.	Defective part in driver or power amplifier stage.	Replace A2Q2 through A2Q5 or A4Q2 through A4Q5 in turn. If trouble continues, replace A2CR1 or A4CR1 and, if necessary, check A2R7, A2C3, and A2C4 or A4R7, A4C3, and A4C4.
Output of one channel contains low-frequency oscillations (motor-boating).	Open filter capacitors in preamplifier or output stage.	Check A2C1 through A2C4 or A4C1 through A4C4. If normal, check A1C1 and A1C2 or A4C1 and A4C2.
Output of one channel contains objectionable noise (hum, hash, etc.) when amplifier is in operation or in standby condition.	Signal source generating excessive noise.	Turn appropriate INPUT LEVEL control counterclockwise (low-gain position). If noise is reduced, check high-level input signal source. If noise is not reduced, check A1C1 and A1C2 or A4C1 and A4C2.
Output of both channels contains objectionable noise (hum, hash, etc.) when amplifier is in operation or in standby condition.	External electrical equipment generating excessive noise.	Check electrical system for source of noise.

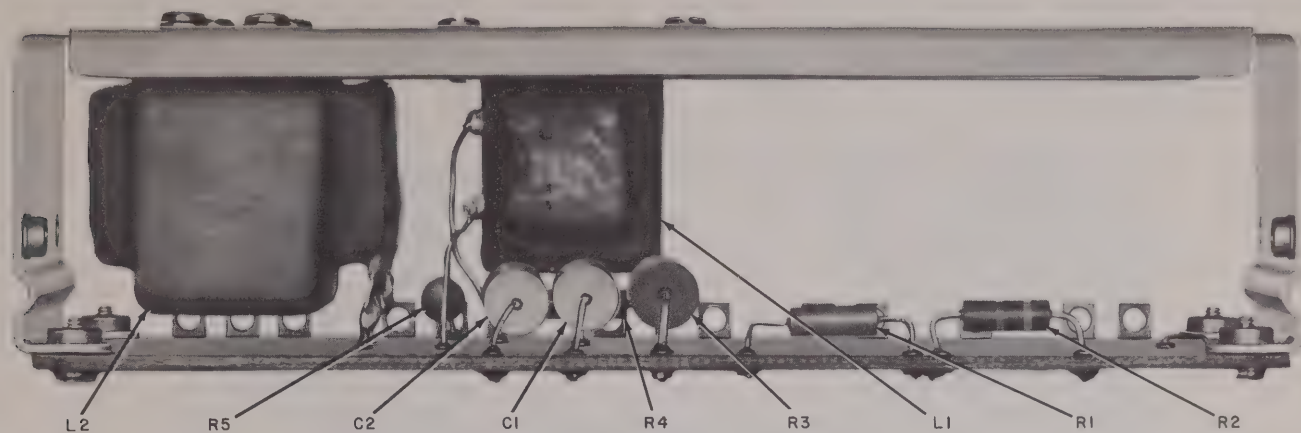


Figure 4-3. Filter Assembly A1 or A3, Left Side View

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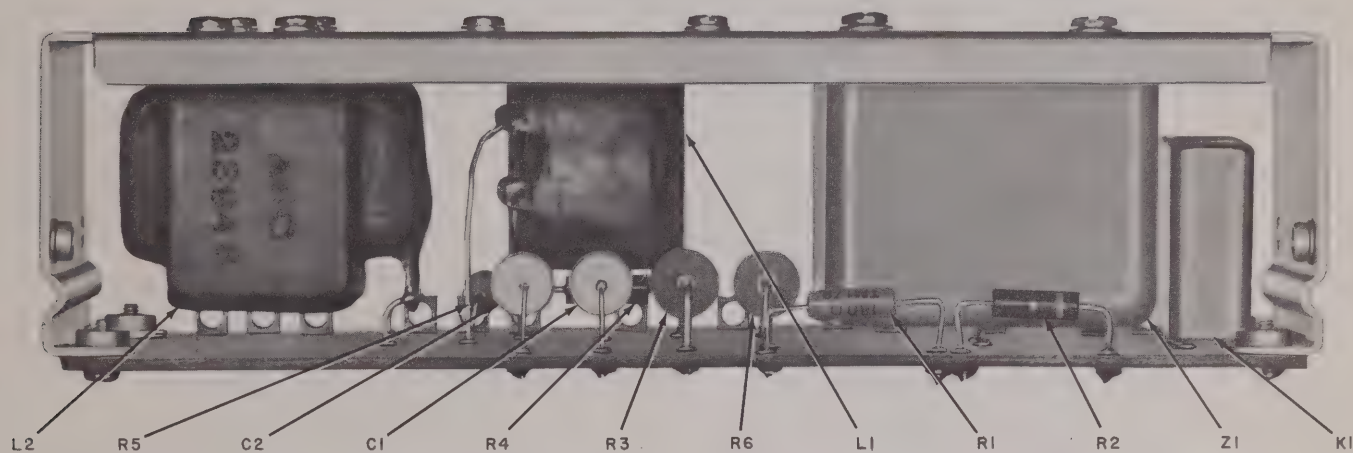


Figure 4-4. Filter Assembly A1 or A3 with Filter Kit ARC-24347, Left Side View

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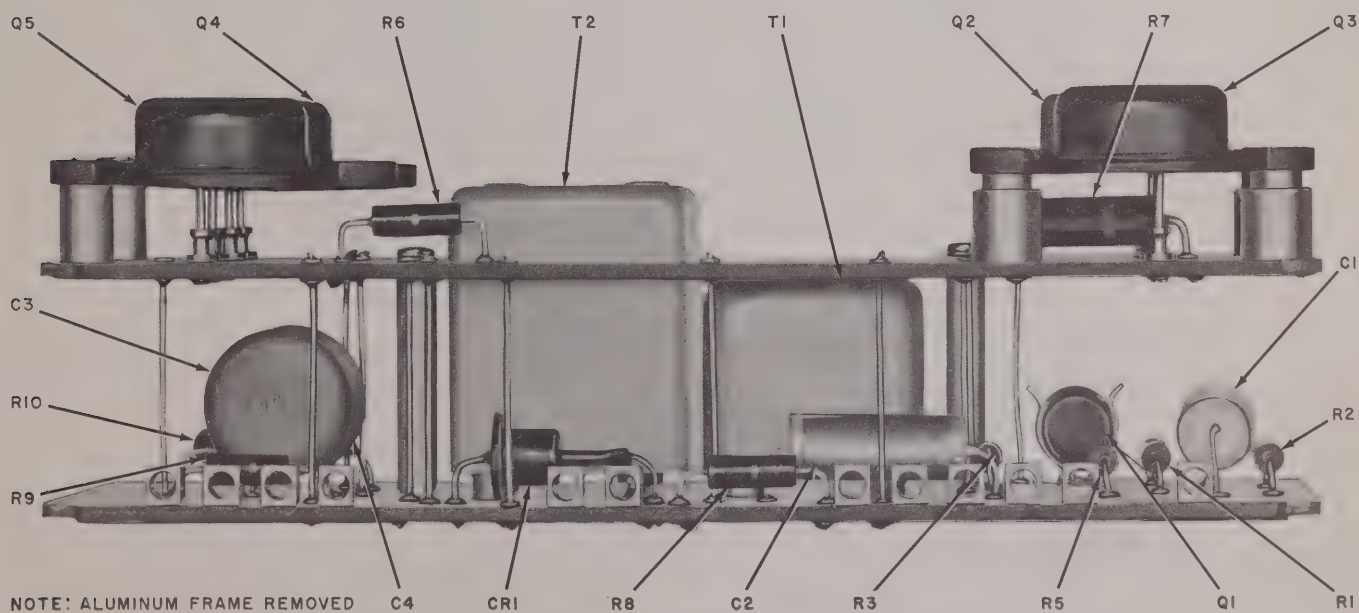
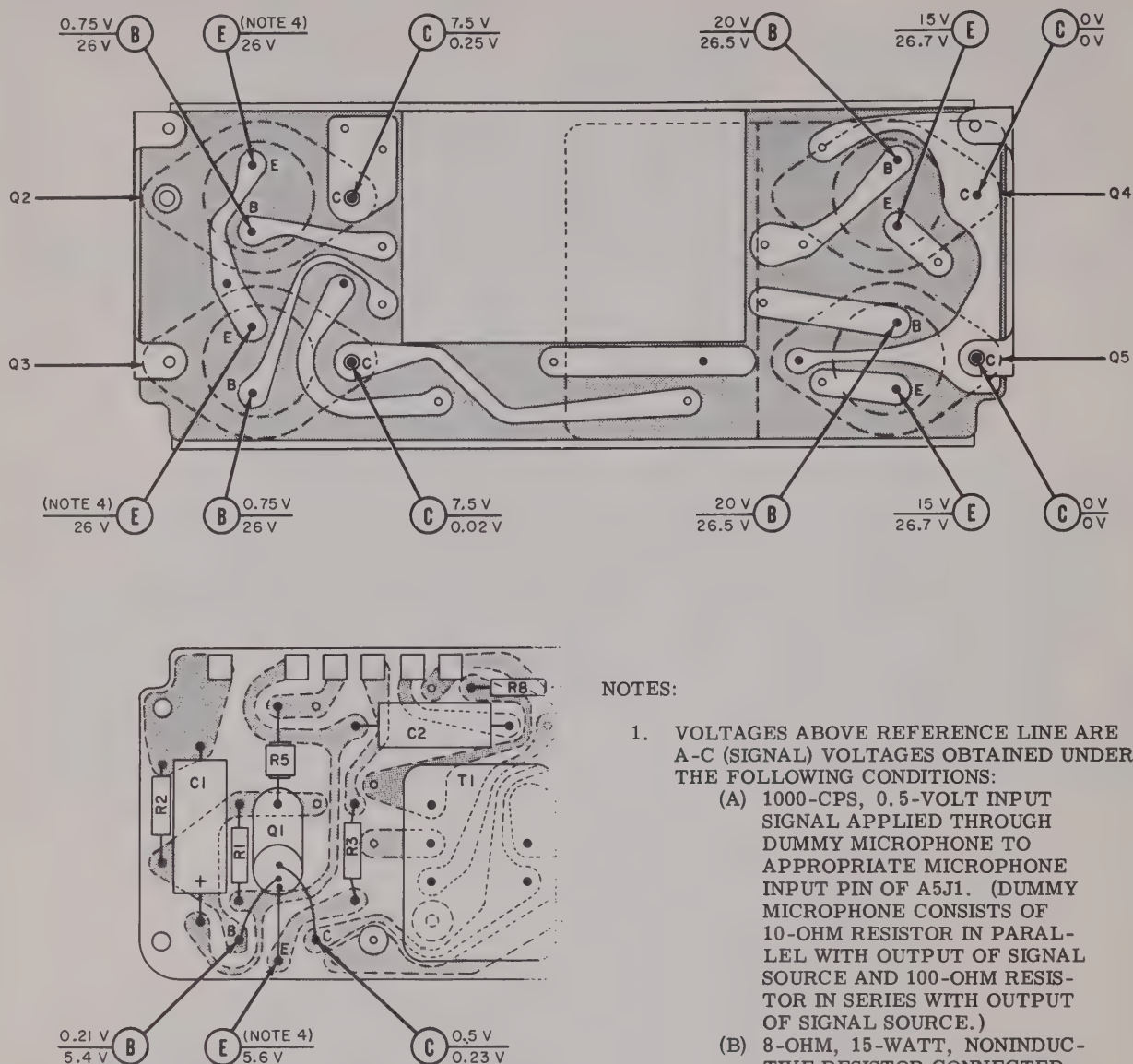


Figure 4-5. Amplifier Assembly A2 or A4, Right Side View

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NOTES:

- VOLTAGES ABOVE REFERENCE LINE ARE A-C (SIGNAL) VOLTAGES OBTAINED UNDER THE FOLLOWING CONDITIONS:
 - 1000-CPS, 0.5-VOLT INPUT SIGNAL APPLIED THROUGH DUMMY MICROPHONE TO APPROPRIATE MICROPHONE INPUT PIN OF A5J1. (DUMMY MICROPHONE CONSISTS OF 10-OHM RESISTOR IN PARALLEL WITH OUTPUT OF SIGNAL SOURCE AND 100-OHM RESISTOR IN SERIES WITH OUTPUT OF SIGNAL SOURCE.)
 - 8-OHM, 15-WATT, NONINDUCTIVE RESISTOR CONNECTED BETWEEN APPROPRIATE 8-OHM OUTPUT PIN OF A5J1 AND GROUND TO PROVIDE MATCHED OUTPUT LOAD.
 - MEASUREMENTS MADE WITH RESPECT TO GROUND USING BALLANTINE MODEL 300 VOLTMETER.
- VOLTAGES BELOW REFERENCE LINE ARE D-C VOLTAGES OBTAINED UNDER THE FOLLOWING CONDITIONS:
 - NO SIGNAL INPUT.
 - PRIMARY VOLTAGE IS 28 VOLTS DC.
 - MEASUREMENTS ARE MADE WITH RESPECT TO GROUND USING A HEWLETT-PACKARD MODEL 410B VACUUM TUBE VOLTMETER.
 - A5R1 AND A5R2, OR A5R5 AND A5R6 ARE SET FULLY CLOCKWISE.
- VOLTAGES ARE $\pm 20\%$.
- NO SIGNIFICANT MEASUREMENT.

Figure 4-6. Amplifier Assembly A2 or A4, Voltage Diagram

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SECTION V

DIAGRAMS

Figure 5-1. F-16A Audio Amplifier, Schematic Diagram

Figure 5-2. Main Assembly A5, Wiring Diagram

Figure 5-3. Filter Assembly A1 or A3, Wiring Diagram

Figure 5-4. Amplifier Assembly A2 or A4, Wiring Diagram

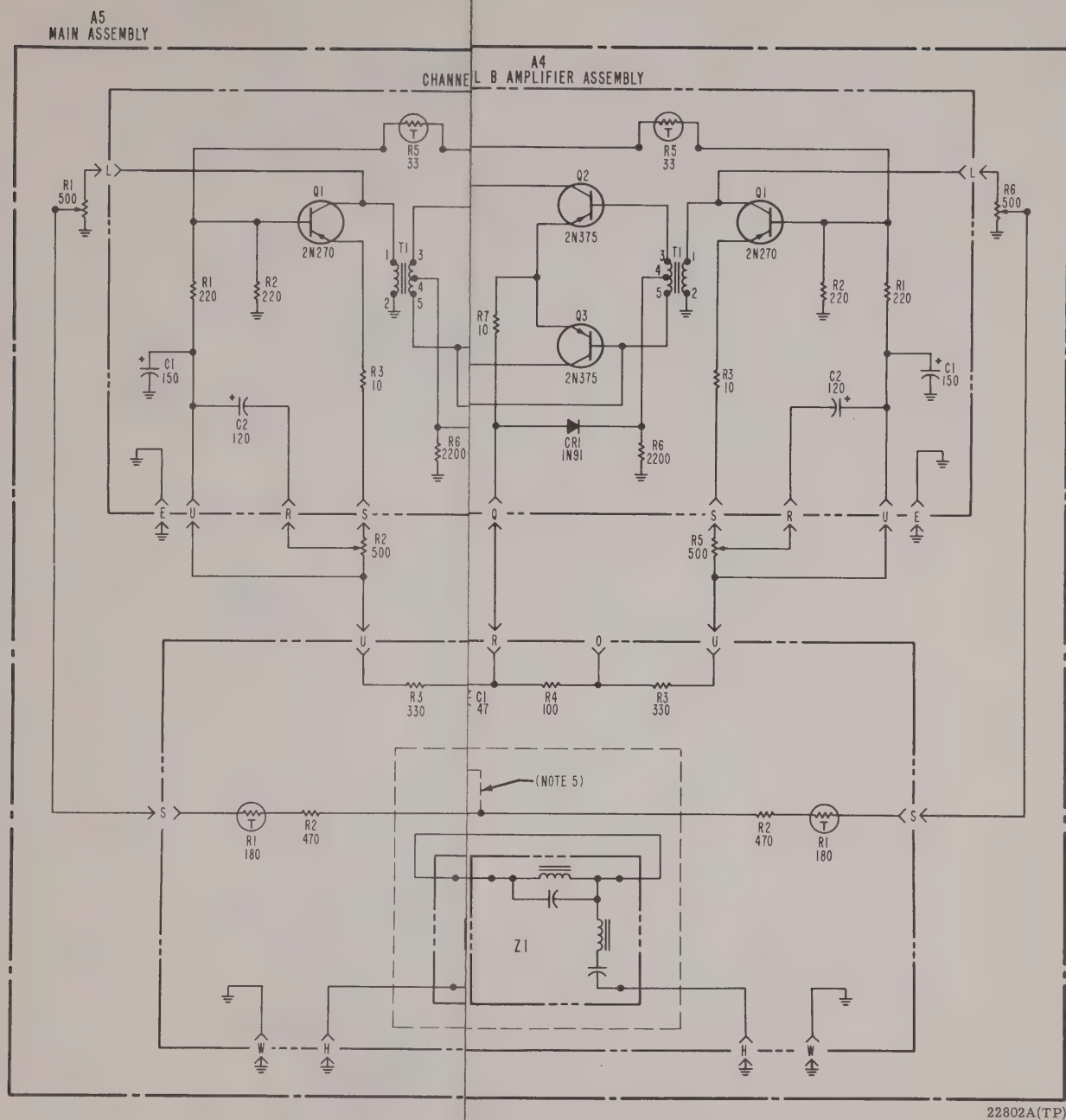
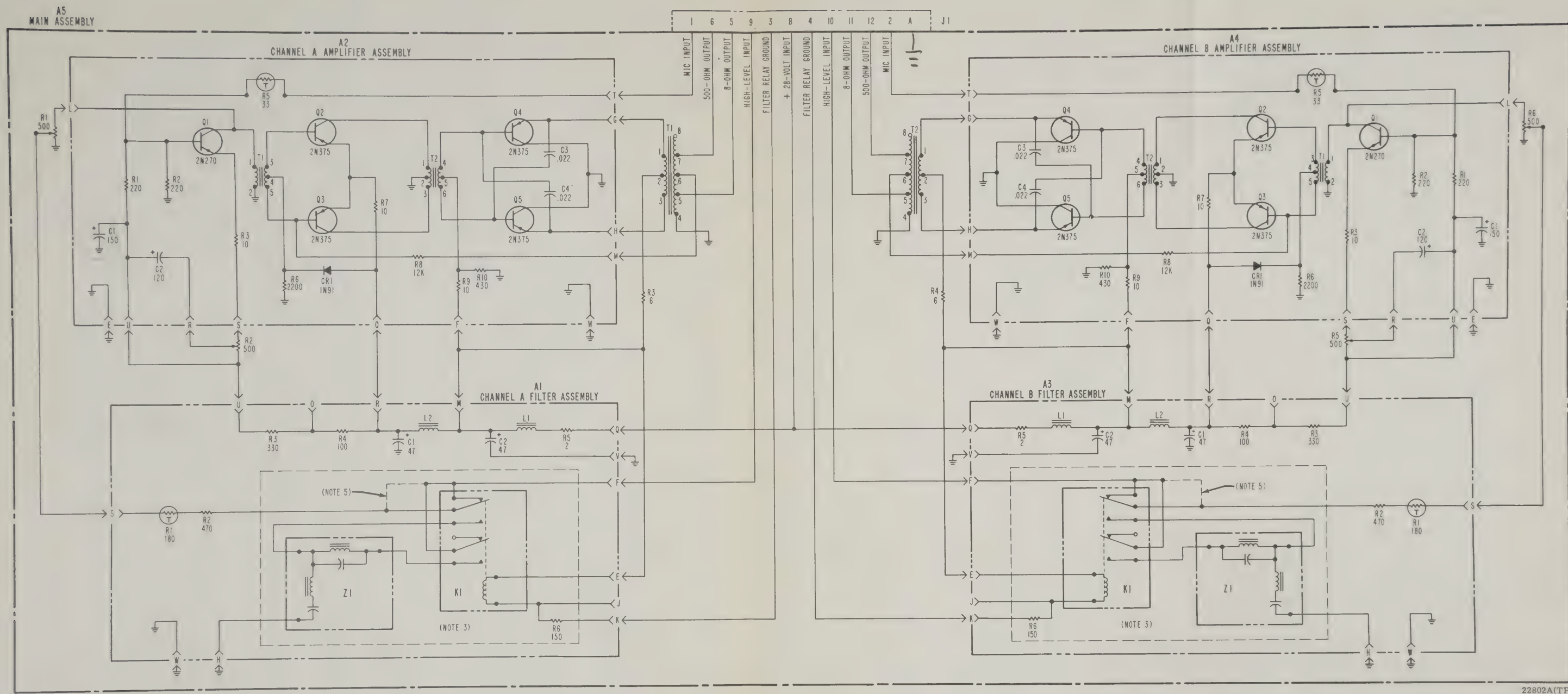
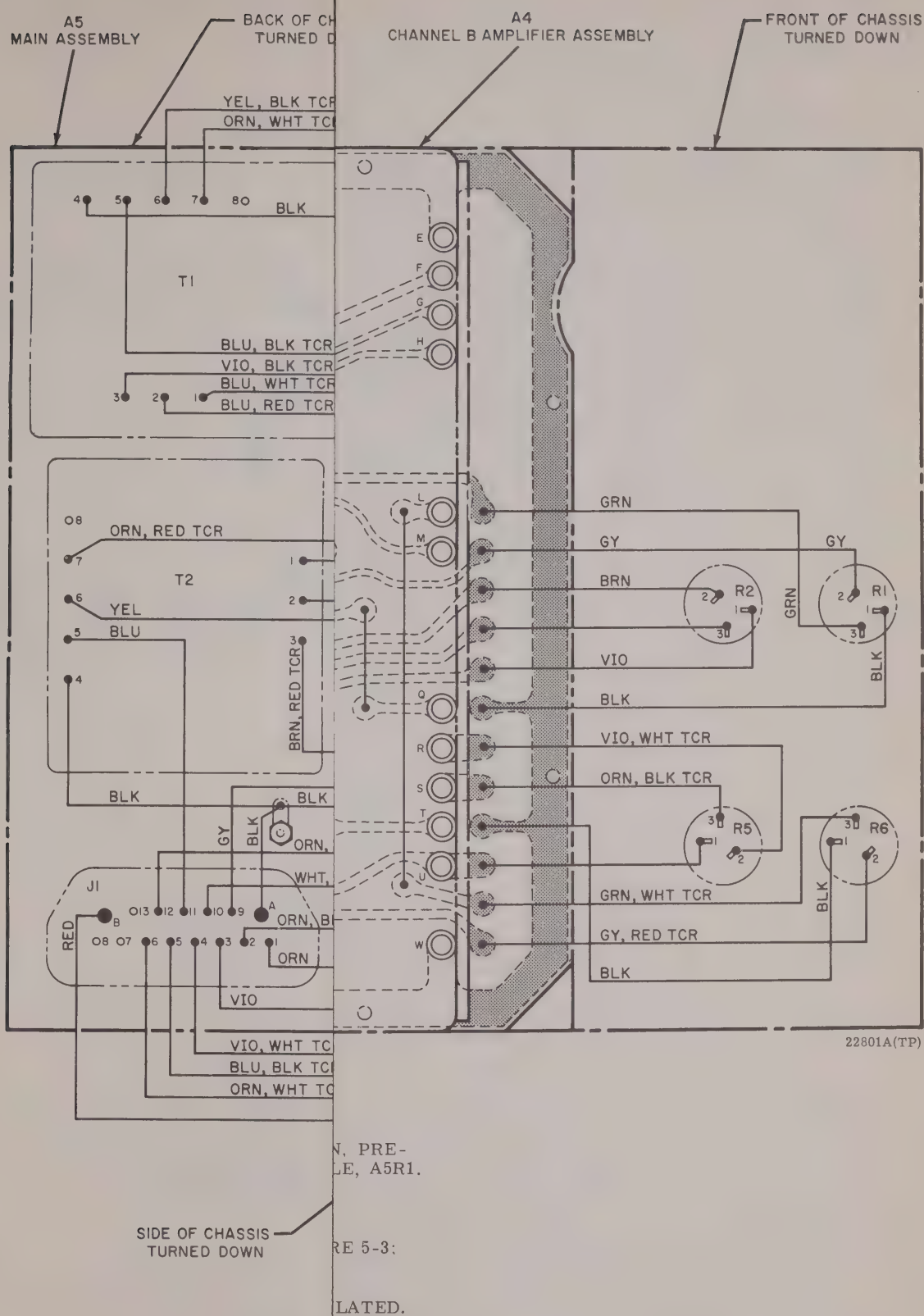


Figure 5-1. F-16A Audio Amplifier, Schematic Diagram

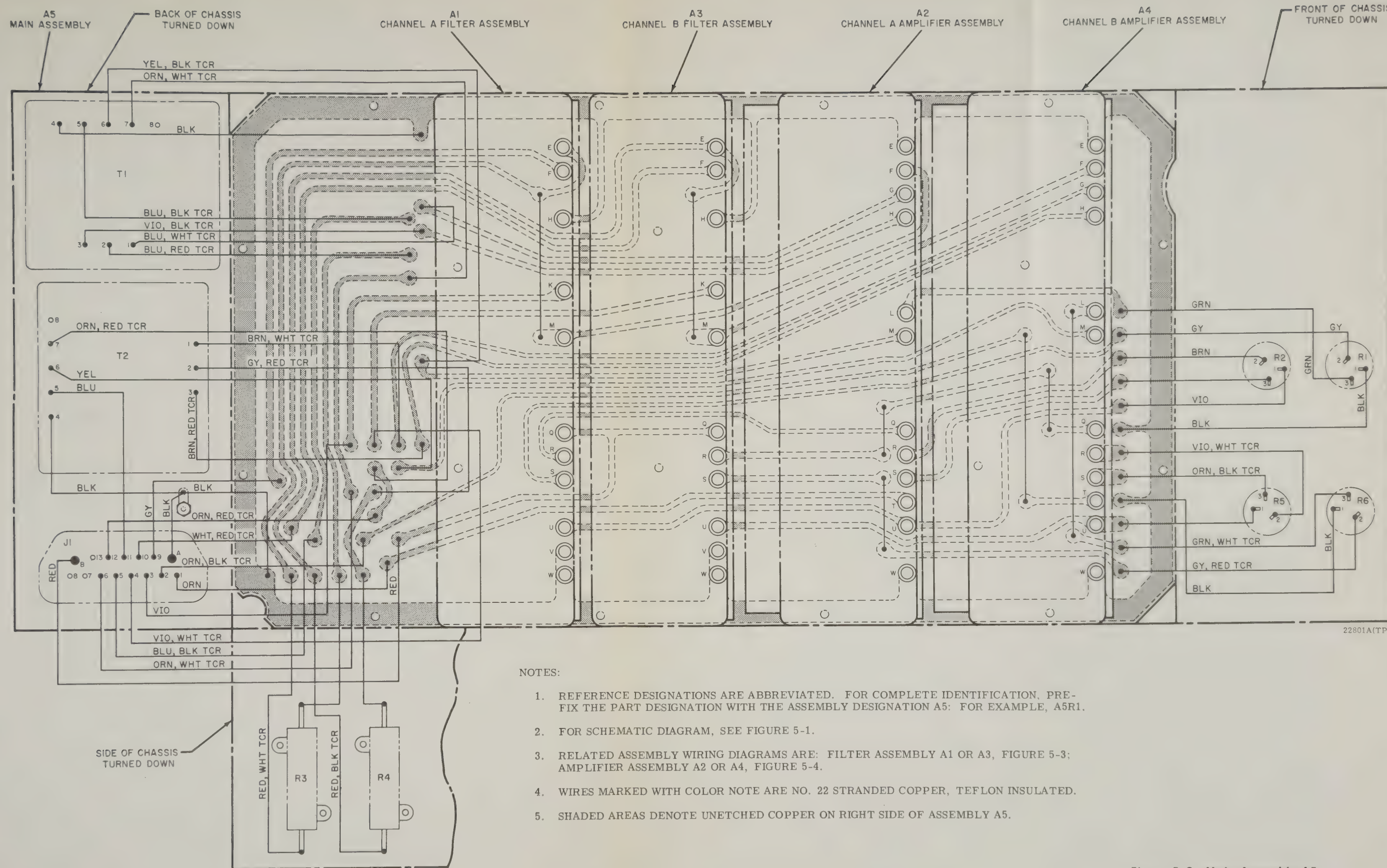


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Figure 5-1. F-16A Audio Amplifier, Schematic Diagram



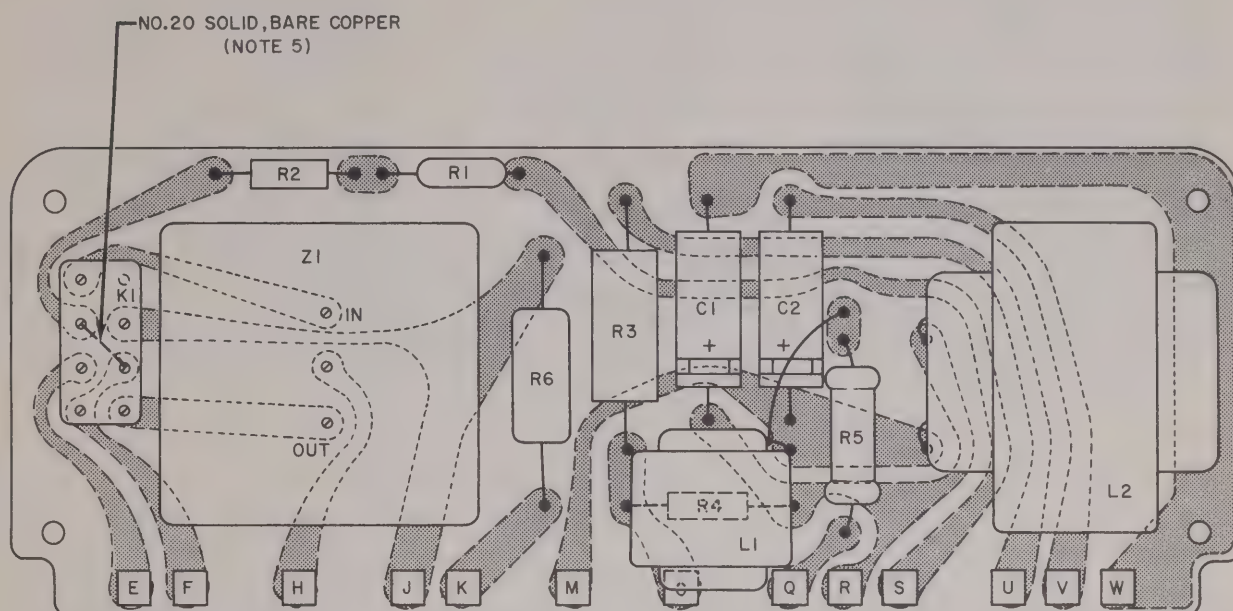
**Figure 5–2. Main Assembly A5,
Wiring Diagram**



NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION A5: FOR EXAMPLE, A5R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 5-1.
3. RELATED ASSEMBLY WIRING DIAGRAMS ARE: FILTER ASSEMBLY A1 OR A3, FIGURE 5-3; AMPLIFIER ASSEMBLY A2 OR A4, FIGURE 5-4.
4. WIRES MARKED WITH COLOR NOTE ARE NO. 22 STRANDED COPPER, TEFLON INSULATED.
5. SHADED AREAS DENOTE UNETCHED COPPER ON RIGHT SIDE OF ASSEMBLY A5.

Figure 5-2. Main Assembly A5,
Wiring Diagram

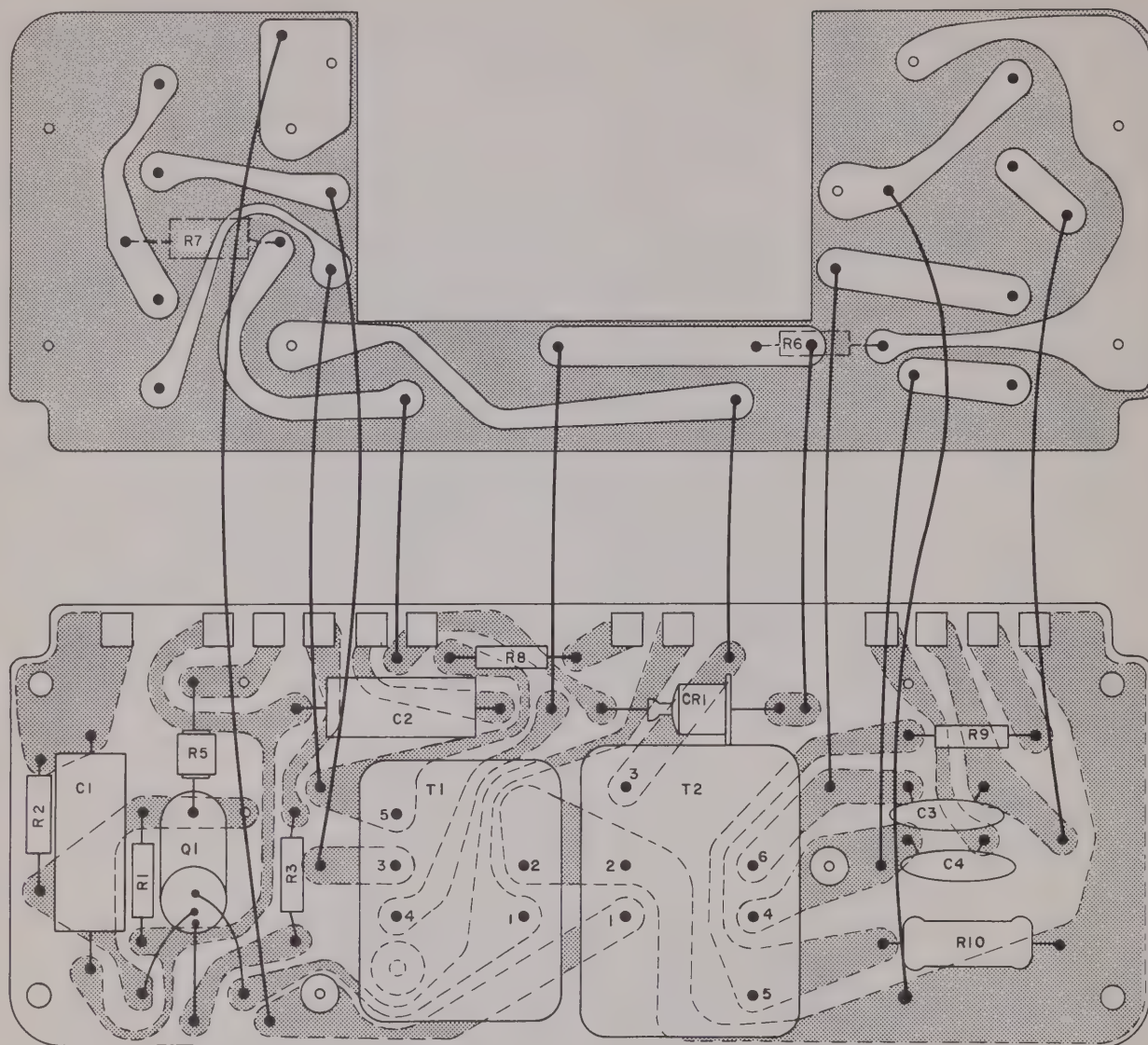


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION A1 OR A3: FOR EXAMPLE, A1R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 5-1.
3. FOR INTERCONNECTIONS TO MAIN ASSEMBLY A5, SEE FIGURE 5-2.
4. SHADED AREAS DENOTE UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.
5. Z1, K1, AND R6 ARE PART OF FILTER KIT ARC-24347 (OPTIONAL EQUIPMENT). WIRE IS NOT USED IF FILTER KIT IS INSTALLED.

Figure 5-3. Filter Assembly A1 or A3, Wiring Diagram

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NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION A2 OR A4: FOR EXAMPLE, A2R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 5-1.
3. FOR INTERCONNECTIONS TO MAIN ASSEMBLY A5, SEE FIGURE 5-2.
4. INTERCONNECTING WIRES ARE NO. 20 SOLID, BARE COPPER.

Figure 5-4. Amplifier Assembly A2 or A4, Wiring Diagram

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SECTION VI

PARTS LIST

TABLE 6-1. MANUFACTURERS' CODES

<u>Code</u>	<u>Name and Address</u>
AB	Allen-Bradley Co. Milwaukee, Wisconsin
AMP	Amphenol-Borg Electronics Corp. Broadview (Chicago), Illinois
CMPB	Colin Campbell Co., Inc. Danbury, Connecticut
DABU	Dale Products, Inc. Columbus, Nebraska
GE	General Electric Co. Schenectady, New York
SLE	Sylvania Electric Products, Inc. New York, New York
SPR	Sprague Electric Co. North Adams, Massachusetts
TI	Texas Instruments, Inc. Semiconductor- Components Div. Houston, Texas
UNT	United Transfer Co. New York, New York

TABLE 6-2. PARTS LIST

Reference Designation	Description	ARC Part No.	Manufacturer & Part No.
A1, FILTER MODULE ASSEMBLY, ARC-24040			
A1C1	CAPACITOR, Fixed, electrolytic, 47 μ f $\pm$ 20 per cent	8924-0470	SPR 109D476X0050F2
A1C2	CAPACITOR, Fixed, same as A1C1		
A1K1	RELAY, Armature	24110-0014	GE 3S2791G310A5
A1L1	REACTOR	21429	CMPB L-2254
A1L2	REACTOR	23948	CMPB L-2726
A1R1	RESISTOR, Temperature sensitive, 180 ohms $\pm$ 10 per cent, 1/8w	8944-0181	TI TM1/8R181
A1R2	RESISTOR, Fixed, comp, 470 ohms $\pm$ 5 per cent, 1/2w	201-0471	AB EB4715
A1R3	RESISTOR, Fixed, comp, 330 ohms $\pm$ 5 per cent, 2w	203-0331	AB HB3315
A1R4	RESISTOR, Fixed, comp, 100 ohms $\pm$ 5 per cent, 1/2w	201-0101	AB EB1015
A1R5	RESISTOR, Fixed, ww, 2 ohms $\pm$ 3 per cent, 3w	209-9201	DABU RS2-2
A1R6	RESISTOR, Fixed, comp, 150 ohms $\pm$ 5 per cent, 2w	203-0151	AB HB1515
A1Z1	FILTER	23877	UNT AF305
A2, AMPLIFIER MODULE ASSEMBLY, ARC-24035			
A2C1	CAPACITOR, Fixed, electrolytic, 150 μ f $\pm$ 20 per cent, 15 vdcw	8920-0151	SPR 150D157X0015S2
A2C2	CAPACITOR, Fixed, electrolytic, 120 μ f $\pm$ 20 per cent, 10 vdcw	8919-0121	SPR 150D127X0010R2
A2C3	CAPACITOR, Fixed, ceramic, 0.022 μ f, $\pm$ 20 per cent, 500 vdcw	8627-9223	AB 40-223W
A2C4	CAPACITOR, Fixed, same as A2C3		
A2CR1	SEMICONDUCTOR DEVICE, Diode, type 1N91	18723	
A2Q1	TRANSISTOR, Type 2N270	22635	
A2Q2	TRANSISTOR, Type 2N375	22289	
A2Q3	TRANSISTOR, Same as A2Q2		
A2Q4	TRANSISTOR, Same as A2Q2		
A2Q5	TRANSISTOR, Same as A2Q2		
A2R1	RESISTOR, Fixed, comp, 220 ohms $\pm$ 5 per cent, 1/2w	201-0221	AB EB2215
A2R2	RESISTOR, Fixed, same as A2R1		
A2R3	RESISTOR, Fixed, comp, 10 ohms $\pm$ 5 per cent, 1/2w	201-0100	AB EB1005
A2R4	RESISTOR, Temperature sensitive, 100 ohms $\pm$ 10 per cent, 1/8w	8944-0101	TI TM1/8-101K
A2R5	RESISTOR, Fixed, comp, 47 ohms $\pm$ 5 per cent, 1/2w	201-0470	AB EB4705
A2R6	RESISTOR, Fixed, comp, 2200 ohms $\pm$ 5 per cent, 1/2w	201-0222	AB EB2225
A2R7	RESISTOR, Fixed, comp, 10 ohms $\pm$ 5 per cent, 1w	202-0100	AB GB1005
A2R8	RESISTOR, Fixed, comp, 12,000 ohms $\pm$ 5 per cent, 1/2w	201-0123	AB EB1235
A2R9	RESISTOR, Fixed, same as A2R3		

TABLE 6-2. PARTS LIST - Continued

Reference Designation	Description	ARC Part No.	Manufacturer & Part No.
A2, AMPLIFIER MODULE ASSEMBLY, ARC-24035 - Continued			
A2R10	RESISTOR, Fixed, ww, 430 ohms ± 3 per cent, 3w	209-0431	DABU RS2-430
A2T1	TRANSFORMER, Audio	22340	SLE 25346
A2T2	TRANSFORMER, Audio driver	24668	SLE 25347-1
A3, FILTER MODULE ASSEMBLY, ARC-24040			
A3C1	CAPACITOR, Fixed, electrolytic, 47 μ f ± 20 per cent	8924-0470	SPR 109D476X0050F2
A3C2	CAPACITOR, Fixed, same as A3C1		
A3K1	RELAY, Armature	24110-0014	GE 3S2791G310A5
A3L1	REACTOR	21429	CMPB L-2254
A3L2	REACTOR	23948	CMPB L-2726
A3R1	RESISTOR, Temperature sensitive, 180 ohms ± 10 per cent, 1/8w	8944-0181	TI TM1/8R181
A3R2	RESISTOR, Fixed, comp, 470 ohms ± 5 per cent, 1/2w	201-0471	AB EB4715
A3R3	RESISTOR, Fixed, comp, 330 ohms ± 5 per cent, 2w	203-0331	AB HB3315
A3R4	RESISTOR, Fixed, comp, 100 ohms ± 5 per cent, 1/2w	201-0101	AB EB1015
A3R5	RESISTOR, Fixed, ww, 2 ohms ± 3 per cent, 3w	209-9201	DABU RS2-2
A3R6	RESISTOR, Fixed, comp, 150 ohms ± 5 per cent, 2w	203-0151	AB HB1515
A3Z1	FILTER	23877	UNT AF305
A4, AMPLIFIER MODULE ASSEMBLY, ARC-24035			
A4C1	CAPACITOR, Fixed, electrolytic, 150 μ f ± 20 per cent, 15 vdcw	8920-0151	SPR 150D157X0015S2
A4C2	CAPACITOR, Fixed, electrolytic, 120 μ f ± 20 per cent, 10 vdcw	8919-0121	SPR 150D127X0010R2
A4C3	CAPACITOR, Fixed, ceramic, 0.022 μ f ± 20 per cent, 500 vdcw	8627-9223	AB 40-223W
A4C4	CAPACITOR, Fixed, same as A4C3		
A4CR1	SEMICONDUCTOR DEVICE, Diode, type 1N91	18723	
A4Q1	TRANSISTOR, Type 2N270	22635	
A4Q2	TRANSISTOR, Type 2N375	22289	
A4Q3	TRANSISTOR, Same as A4Q2		
A4Q4	TRANSISTOR, Same as A4Q2		
A4Q5	TRANSISTOR, Same as A4Q2		
A4R1	RESISTOR, Fixed, comp, 220 ohms ± 5 per cent, 1/2w	201-0221	AB EB2215
A4R2	RESISTOR, Fixed, same as A4R1		
A4R3	RESISTOR, Fixed, comp, 10 ohms ± 5 per cent, 1/2w	201-0100	AB EB1005
A4R4	RESISTOR, Temperature sensitive, 100 ohms ± 10 per cent, 1/8w	8944-0101	TI TM1/8-101K
A4R5	RESISTOR, Fixed, comp, 47 ohms ± 5 per cent, 1/2w	201-0470	AB EB4705

TABLE 6-2. PART LIST - Continued

Reference Designation	Description	ARC Part No.	Manufacturer & Part No.
A-4, AMPLIFIER MODULE ASSEMBLY, ARC-24035 - Continued			
A4R6	RESISTOR, Fixed, comp, 2200 ohms ± 5 per cent, 1/2w	201-0222	AB EB2225
A4R7	RESISTOR, Fixed, comp, 10 ohms ± 5 per cent, 1w	202-0100	AB GB1005
A4R8	RESISTOR, Fixed, comp, 12,000 ohms ± 5 per cent, 1/2w	201-0123	AB EB1235
A4R9	RESISTOR, Fixed, same as A4R3		
A4R10	RESISTOR, Fixed, ww, 430 ohms ± 3 per cent, 3w	209-0431	DABU RS2-430
A4T1	TRANSFORMER, Audio	22340	SLE 25346
A4T2	TRANSFORMER, Audio driver	24668	SLE 25347-1
A5, CHASSIS ASSEMBLY			
A5J1	CONNECTOR, Receptacle, electrical	21768	AMP 94-21320-2
A5R1	RESISTOR, Variable, comp, 500 ohms ± 20 per cent, 0.5w	8915-0501	AB GLU501SD3028L
A5R2	RESISTOR, Variable, same as A5R1		
A5R3	RESISTOR, Fixed, ww, 6 ohms ± 3 per cent, 25w	340-9601	DABU RH-25-6R0H
A5R4	RESISTOR, Fixed, same as A5R3		
A5R5	RESISTOR, Variable, same as A5R1		
A5R6	RESISTOR, Variable, same as A5R1		
A5T1	TRANSFORMER, Audio output	23874	SLE 25527A
A5T2	TRANSFORMER, Audio output, same as A5T1		



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